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THE TREATMENT OF CHRONIC MIDDLE EAR SUPPURATION *

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The ideal therapeutic procedure is one that cures the disease with the minimum of danger to the life of the patient, and with the least possible damage to normal tissues and to the function of important organs.

This is the very foundation of all surgery, and must not be forgotten by those of us who treat the diseases of the eye, ear, nose, throat and larynx. The majority of the maladies of these organs of special sense are due to bacterial infection, and it is of the greatest importance for the future comfort and happiness of the patient that the functions of these organs should be retained or restored to normal. It is not good surgery to cure a chronic suppurative sinusitis by the removal of large areas of mucous membrane for no other reason than the fact that it is infected and thickened and looks abnormal. Such a radical procedure may relieve the patient of the pain or the discharge, but often deprives him permanently of the sense of smell and taste, and leaves the nasal passages dry and uncomfortable for the rest of his life. It is not necessary to destroy nerves and tendons in the treatment of an infection of the hand, and we do not believe it is necessary to remove with the curet the mucous membrane of the accessory nasal sinuses because it is infected. Adequate drainage, together with general hygienic measures, careful after-treatment of the local area and the judicious use of bactericidal substances such as mercurochrome-220 soluble, gentian violet and surgical solution of chlorinated soda will usually result in a complete cure with normal function.

What we have said about the nasal cavities is especially applicable to the treatment of a chronic infection of the mastoid and middle ear. In Germany, Austria, England and in many places in this country, it is taught that a radical operation, with the removal of the drum, ossicles and every particle of mucous membrane is indicated in every patient who

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has a discharge of long standing with polyps and granulations in the external auditory canal; with a cholesteatoma; and with a marked impairment of hearing. The ability to hear, however, does not depend entirely on the appearance of the drum or ossicles. All of us have seen the function of the ear gradually return to normal after the spontaneous healing of the destructive process associated with scarlet fever; and with patients with a large defect in the drum, the hearing is often much better when there is a little discharge in the middle ear. In other words, the mucous membrane of the middle ear, as in the nasal cavities, is important. If destroyed, it is replaced with squamous epithelium and its mucous glands will not regenerate.

CONSERVATIVE METHODS

With these facts in mind, we began, in 1912, to try conservative methods in order to avoid a radical mastoid operation. The general physical condition and hygiene are improved when possible, nasal obstructions are removed, and infections in the upper air passages and teeth are treated before the operation on the ear. The infection in the mastoid cells is thoroughly removed, and the passage from the antrum into the middle ear is enlarged as much as possible by removing the cells in the posterior part of the zygoma. If kept open, this permits through and through irrigation of the middle ear cavity with surgical solution of chlorinated soda, the fluid entering the middle ear by way of the antrum and coming out into the external auditory canal through the defect in the drum. If polyps and granulations protrude through the drum, an opening is made into the external auditory canal, external to this membrane, and the obstructions to drainage are carefully removed. It is dangerous to remove an aural polyp with a snare or with traction, because the point of attachment may lie over the facial nerve or near the stapes.

EXPERIMENT

In order to obtain some idea of the end-result of this treatment as compared with a radical operation, we recently went through the hospital records and selected eighty-six of the worst cases for study. On admission to the hospital, each of these patients had every indication for a radical mastoid operation, but was treated as outlined in the foregoing. One feature that continually stimulates us to try to cure a chronic suppuration of the ear without removal of ossicles, drum and mucous membrane is the fact that such a high percentage of the patients are less than 20 years of age, and that in many of these the infection is bilateral. There was a definite cholesteatoma in fifteen patients in this series, and ten of these were less than 20 years of age. Each of

these eighty-six patients had a history of longstanding discharge from the ear, and the average duration of the discharge was eleven years for the entire group.

Accurate hearing tests were not obtained on many of the children either before or after operation. The majority of the patients included in this series do not live in Maryland, and the information in regard to the condition of the ear was obtained by letter and not by actual examination. Our data on the hearing, therefore, are subjective rather than objective.

OBJECT AND RESULTS OF EXPERIMENT

The primary object of this experiment (that is, the performance of a simple conservative operation on patients who had every indication for a radical procedure) was to determine the following points:

1. Is it possible to stop the discharge with a simple mastoid operation and through and through irrigation of the middle ear cavity.

2. Do patients treated in this way have a recurrence of the cholesteatoma, polyps or granulations, and has any patient subsequently had an intracranial complication, such as brain abscess, meningitis or labyrinthitis, as a result of this incomplete operation.

3. Is the hearing improved as a result of the conservative treatment, or is it any better than in a similar group that has had a radical mastoid operation.

The data on which we have the answer to the before-mentioned questions were obtained in the majority of the eighty-six patients studied by writing directly to the subjects. The answers indicate that the following statements are true:

1. That it is possible to stop the discharge and sterilize the middle ear cavity with the treatment, as outlined in the foregoing. Such a result, however, depends on the thoroughness of the operation and the most careful attention to the postoperative treatment. No packing or drains of any kind must be used in the operative wound or in the external auditory canal because of the danger of introducing skin staphylococci. Cotton applicators used in cleansing the external auditory canal and middle ear must be sterile. The skin around the wound must be shaved at frequent intervals during the three weeks of postoperative treatment, and the entire area around the ear must be kept clean. Silver nitrate is applied to the granulations of the middle ear when indicated.

Among the eighty-six replies to the question about the discharge from the operated ear, we have had letters from twenty-eight patients who state that the ear is dry: twelve of these were followed for less than 1 year; twelve from 1 to 5 years, and four from 5 to 10 years. Of the

remaining fifty-eight patients, nineteen continue to have discharge, and in four of these it has persisted throughout the 5 to 10 year period since the operation. On the other hand, thirty-nine of these fifty-eight patients at times have some discharge from the ear but much less than before operation.

When we consider that in many of the patients in this group the ear had discharged for twenty years, and the average duration of the discharge for the entire group of eighty-six cases was eleven years, we are encouraged to hope that more careful postoperative treatment will result in a cure in a much larger percentage.

2. No patient in the entire group has had any intracranial or inner ear complication. It has been stated before that we selected for this study eighty-six patients who had every indication for a radical mastoid operation, including fifteen with a cholesteatoma. Thirty-four have been observed for less than 1 year; thirty-five from 1 to 5 years; and seventeen from 5 to 10 years. Only two of these patients have subsequently had a radical operation: one returned to Baltimore, and one was operated on by Dr. John Shea of Memphis. Thus it seems fair to conclude that an attempt to cure a chronic suppurating ear without removal of the drum and ossicles does not subject the patient to any great risk of subsequent complications as a result of the conservative treatment.

3. As regards the hearing, we have reliable data on only sixty-three cases: 60 per cent. of these report that the hearing is better than before operation, and only one patient writes that the deafness has increased since the operation. This result encourages us to hope that with better and more careful treatment, useful hearing may be restored in a much larger percentage. In our experience, the preservation of useful hearing after a radical operation is an uncertain factor.

SUMMARY

We have looked over the records of every patient with chronic mastoiditis who has been treated at the Johns Hopkins Hospital during the last eleven years, and selected for this report eighty-six patients who at the time of their admission had a history of long standing discharge, granulations or polyps protruding through the tympanic membrane and a marked impairment of hearing. Instead of performing a radical operation, we attempted to relieve these patients without removal of the ossicles or the remnants of the drum. It is our impression that the infection in the middle ear can be controlled if the contributing factors are removed, and if, during the postoperative period of treatment, the middle ear cavity is irrigated at frequent intervals with such disinfecting fluids as surgical solution of chlorinated soda, bichlorid

solution 1 : 10,000, formaldehyd, or silver nitrate 1 : 1,000. The object of such treatment was to try to stop the discharge, to improve the hearing, and at the same time not subject the patient to a continued risk of intracranial infection due to conservative operation.

CONCLUSIONS

The results that we present are not so conclusive as we would wish, because the majority of these eighty-six patients do not live in Baltimore or even in Maryland. Our information in regard to the present condition of the ear, therefore, was obtained by letter. This is unsatisfactory as regards the hearing and the appearance of the tympanic cavity, but is quite conclusive as regards the discharge and any subsequent complications. The hearing was definitely improved in 60 per cent.; about the same in 38 per cent., and worse than before the operation in 2 per cent. of the patients. The discharge has completely stopped in 33 per cent.; is very slight in amount and intermittent in 45 per cent., and is unchanged in amount or character in 22 per cent. There has been no intracranial complication in the entire group.

We have noted that if improvement in hearing follows the treatment outlined in the foregoing, it becomes quite evident within a few weeks. It is the duty of the surgeon to maintain or to restore the function of an organ of special sense, and, if it can be done without risk to the patient, the radical procedures should be postponed until the conservative measures have proved a failure.

WHAT CAN BE HEARD WITHOUT A COCHLEA AND THE PROBLEM OF DETERMINING MONAURAL DEAFNESS

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The difficulty in establishing the presence of a total defect of hearing in one ear is the difficulty of excluding the other hearing ear. In testing the lower end of the tone range, the opposite ear can readily be excluded by simply closing the external meatus. The higher one goes in the tone scale, the more difficult it becomes to exclude the other ear.

VOICE TESTS

In making the voice tests, either whispered or spoken, this simple method is satisfactory for most practical purposes except in patients in whom the defect is extensive, particularly when it is a question whether any remnant of hearing for the voice persists. Here the Dennert control may be used. The test is made by closing the meatus of both ears, and attempting to determine whether the hearing is improved by removing the obstruction on the affected side. This, at best, is a crude test and is not conclusive.

Knapp suggested the following test for the upper tone range, using the c^4 fork (2,048 double vibrations): Close the normal ear, sound the fork and hold it a few inches above the meatus of the ear to be tested. As soon as the perception dies out, bring the fork quickly before the external meatus. If the fork is again heard, the conclusion is that the perception takes place in this ear. Another method of applying the same test is to strike the fork, and ascertain by passing it before the affected ear whether it is heard better as it passes the meatus. This is a practical test, easily carried out, but it has the drawback that the external meatus and the cavum conchae not infrequently act as a resonator for the c^4 fork which increases its intensity when before the external meatus. This fact the observer, as well as the patient, can appreciate.

More recently, the effort has been made to exclude the normal ear by drowning out its hearing through a loud noise made before this ear. This method seems to be capable of drowning out the hearing for this ear, but the test is of no great practical value in determining the existence of total monaural deafness, for the reason that in drowning out the normal ear we at the same time muffle any slight remnant of hearing that may exist in the affected ear, and thus often defeat the very purpose of the test.

Bezold undertook to establish the diagnosis of monaural total deafness by using his instruments for testing the whole tone range. His method was to test patients in whom he assumed there could be no hearing in the one ear. The opposite hearing ear was closed, and the results obtained by testing for the entire tone range of the affected ear recorded. These results represented the parts of the tone range that could not be excluded from the opposite hearing ear, and served as the model for comparison with the result obtained from similar tests applied to patients where a total defect was suspected. This is a time consuming method and too cumbersome to be of any practical value.

The patients selected by Bezold as those in whom there could be no question regarding the existence of a total defect were cases in which the cochlea had been extruded by a sequestrum. It may seem like quibbling to raise the question as to whether the destruction of the cochlea, as in a sequestrum formation, necessarily means the total loss of sound perception for that ear. This is, nevertheless, a legitimate question to raise, and observations have repeatedly been made which indicated that after the destruction of the cochlea some remnants of hearing still seemed to persist in that ear. Naturally, when the opposite ear is intact it seems easier to conclude that what hearing may appear to remain is only the result of our failure to exclude the opposite ear entirely. The problem of determining whether with the destruction of the cochlea there may still persist some remnant of hearing is dependent on the problem of determining the existence of monaural deafness. To assume, as did Bezold; that the destruction of the cochlea means total deafness, is begging the question.

The following case report is a record of my observations on a patient in whom the cochlea on one side had come away in a sequestrum formation, and the examination of whom left the impression that remnants of hearing for part of the tone range persisted in that ear.

REPORT OF CASE

History.—The patient was an intelligent man, aged 23, whom I saw in October, 1924. One year previous he had been severely injured in a mine accident, which had resulted in a bleeding from the left ear. Following the accident he had been confined to bed for several weeks because of his various injuries. Promptly after the accident he had developed otitis media on the left side and the discharge still persisted. He had been too ill immediately following the accident to recall whether this was followed by vertigo, but later he experienced some sensations of vertigo, particularly when turning his head quickly. Since the accident he had been conscious of a loud buzzing tinnitus in the left ear and had noticed that there was no hearing in that ear.

Examination.—The fundus of the external meatus was filled with granulations, through which the probe detected roughened bone. The functional tests indicated by the usual interpretation a total loss of function for the left labyrinth. After rotation to the right, weak nystagmus developed, lasting for ten seconds. Rotation to the left produced a much more vigorous nystagmus,

lasting for eighteen seconds. The testing of the hearing gave exactly the same results obtained after the removal of the cochlea. These will be described later. Following some operation, apparently a curetting of the fundus of the canal, undertaken six months previously, the patient had developed a complete facial paralysis, which was still present.

In our operation, a large sequestrum was lifted from the fundus of the meatus, which on examination was found to contain the whole of the basal coil of the cochlea. That the sequestrum contained the whole of the cochlea was evident from the inclusion of the entire modiolus from which, however, the upper turns of the cochlea had melted away. The patient made a prompt recovery, in three weeks the ear was quite dry and remained under observation for several weeks longer. During this time tests of hearing were repeatedly carried out, always with the identical results which were the same as those obtained before the removal of the sequestrum. The results of these tests may be summed up briefly as follows:

Results.—The hearing in the right ear was normal throughout the entire tone range. The Weber was always lateralized to the normal ear. None of the lower forks up to and including the A Bezold-Edelmann fork was heard when held before the left meatus. There was no hearing for the voice in the left ear, using the Dennert control. The c^2, c^3 and c^4 forks were all heard and their pitch recognized when held before the left ear with the meatus of the right ear closed and the impression was that all of these forks were really heard in the affected ear.

The c^4 (2,048 double vibrations) was selected for more careful testing. With the right meatus closed, this fork was sounded and held 4 inches (10 cm.) above the left meatus until it ceased to be heard, when it was quickly brought before the meatus where it was again distinctly heard. The examiner also noted a marked increase in loudness as the fork was brought before the open meatus, showing that the meatus acted as a resonator for this fork, which fact is frequently observed. Since this increase in loudness might be interpreted as sufficient to carry the tone to the opposite ear, a short, thick piece of rubber tubing was adjusted into the wide open meatus. This, so far as the observer could determine, destroyed the resonator effect of the meatus. The patient, however, was still able to hear this fork when placed before the meatus after the tone had died out with the fork held above the ear.

We next undertook to exclude the normal ear by muffling the hearing in this ear by loud noises. As already pointed out, this muffling of the hearing in the normal ear by loud noises is also capable of muffling to a certain extent remnants of hearing in the opposite ear, as can readily be demonstrated by testing a person with normal binaural hearing and noting the diminution of hearing in the one ear while a noise is being produced for muffling the opposite ear. In spite of this muffling which must have taken place in the affected ear with the noise apparatus before the normal ear, the patient had no difficulty in hearing and in recognizing the tone of the c^4 fork held before the left ear. In place of the usual noise apparatus, the A fork was sounded loudly and the handle forced firmly in the meatus of the right ear. The hearing for the c^4 fork before the left meatus was the same as with the noise apparatus. In both of these tests the fork was not heard except as it was brought before the meatus of the left ear, not even when it was held close to the opposite ear.

One more variation in testing with the c^4 fork was made as follows: The right ear was closed, the fork was held before the meatus of the affected ear until it could no longer be heard. At that moment the obstruction in the right ear was removed but the fork was not again heard.

We then proceeded to the tests with the Edelmann-Galton whistle. The right ear which heard this whistle normally was closed, and the whistle, when

sounded before the meatus of the left ear, began to be heard at 7. With the noise apparatus used to muffle the right ear, the whistle began to be heard at 9, the difference being what one should expect as the result of muffling of the hearing in the one ear while the noise is being produced in the opposite ear. In this experiment again, the whistle could not be heard except before the meatus of the left ear, not even when sounded near the opposite ear.

CONCLUSIONS

The conclusion from these observations seems to be that without the cochlea, that is, without the labyrinth, one may still possess some hearing, particularly in the upper tone ranges. The alternative would be that our methods of excluding the opposite hearing ear are at fault. This, at first thought, would appear to one as the more probable, and yet the evidence of the tests themselves seem to point altogether to the first conclusion. This conclusion is, moreover, borne out by the common clinical observation that in monaural defects in hearing due to degeneration of the eighth nerve, with the meatus of the normal hearing ear closed, there is no perception of the Edelmann-Galton whistle until we reach 20 or even 25, and this, too, in cases where the hearing for the lower tone range is scarcely affected. It would seem that there is a difference between the defect in hearing due to a destruction of the labyrinth and that due to a degeneration of the nerve itself, and that after the loss of the labyrinth alone there may still be a considerable remnant of hearing for the upper tone range which is not found in cases of degeneration of the nerve.

The tests which in this patient indicated the preservation of some remnants of hearing after the sequestration of the cochlea might be summarized as follows:

1. The c^2, c^3 and c^4 forks were all heard before the meatus of the affected ear with the opposite ear closed.

2. The c^4 fork was heard distinctly when brought before the meatus after it ceased to be heard when held a short distance above the affected ear.

3. With the normal ear muffled by the noise apparatus, the c^4 fork was still distinctly heard when held before the affected ear, but was not heard when held a short distance above the ear or even near the opposite normal ear.

4. Removing obstruction to the normal ear the moment the hearing for the c^4 fork, held before the affected ear, had ceased, failed to bring a return of perception which should occur if the tone was actually being heard in the normal ear.

5. The perception for the Edelmann-Galton whistle with the normal ear closed began at 7; with the hearing in the normal ear muffled with the noise apparatus, it began at 9. Both of these results point to percep-

tion in the affected ear, since it is a common clinical experience in other cases of monaural deafness in which the diagnosis is that of degeneration of the eighth nerve, to find little or no hearing throughout the entire range of the Edelmann-Galton whistle in the affected ear, even when the perception at the lower end of the tone range may be normal.

SYNDROME OF AVELLIS

REPORT OF THREE CASES *

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A recital of the following cases will explain the syndrome of the spinal fillet and nucleus ambiguus. This syndrome has been named after Georg Avellis,[1] a German laryngologist. He reported in the *Berliner Klinik,* in 1891, a series of illustrative cases, giving in detail most of the symptoms of this complex, which condition is now recognized by neurologists and laryngologists as an entity.

It is impossible to describe the syndromes of the medulla as those affecting the gray matter or the white matter separately. Usually some part of both of these elements is involved by the lesion. The gray matter of the medulla represents a dominant autonomy over the vital processes of life. It mediates an essential control over respiration, cardiovascular activity, phonation, articulation, deglutition, digestive secretion and metabolism. It also acts as an important relay station for both divisions of the auditory nerve. The white matter of the medulla represents the continuity in all of the major conduction paths which serve to maintain efficient relations between the receptors and the effectors of the body. Not only is the medulla traversed by many of the most important afferent and efferent pathways of the nervous system, but it is also the site of decussation of several conduction systems, notably the mesial fillet, the Deitero spinal, the olivo cerebral and the pyramidal tracts.

The muscles supplied by the glossopharyngeal, the vagus and the spinal accessory nerves may be grouped together, both on account of their relations in the adult and on account of the intimate relations which exist between the three nerves. The glossopharyngeal and the vagus correspond to the posterior branchial arches, the glossopharyngeal to that represented in the adult by the greater cornu of the hyoid bone, and the vagus to those represented by the laryngeal muscles. Consequently, we find the muscles supplied by these nerves to be those associated with the pharynx and the larynx, one of the muscles of the soft palate, the levator palate being also included in this group. The pharyngeal muscles, for the most part, are supplied from the pharyngeal plexus, into which fibers from both the glossopharyngeal and the vagus nerves enter. The laryngeal muscles, however, are supplied by branches coming directly from the stem of the vagus nerve. The spinal accessory nerve stands in such intimate relations with the vagus that its nucleus of origin may well be regarded as an extension of that of the vagus, and, by the union of a portion of its fibers with those of the vagus to form a common trunk, opportunity is afforded for its fibers to participate in the formation of the pharyngeal plexus. There is evidence pointing to the origin of the fibers of the inferior laryngeal nerve, which supplies the majority of the laryngeal muscles, from the spinal accessory nucleus.

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* Read before the American Laryngological Association, June 2, 1924, Swampscott, Mass.

1. Avellis, G.: Clinical Contribution to the Subject of Unilateral Laryngeal Paralysis, Berl. Klin. **40**:1891.

This syndrome is caused by hemorrhage in the area of the nucleus ambiguus and the spinal fillet in the medulla, but may also be produced by cerebrospinal syphilis, tuberculoma or syringomyelia.

A detailed description of the following cases will illustrate this condition.

REPORT OF CASES

CASE 1.—Mrs. S., aged 60, a German-American, whose family history was negative, ten years previous to examination had an attack of neurasthenia and five years previous to examination had severe hemoptysis. For four years before being seen, she had been entirely well, excepting for some time past she had a blood pressure ranging around 200 mm. of mercury.

In June, 1922, the patient suddenly developed a ptosis of the left eyelid, difficulty in swallowing and change of voice. The difficulty in swallowing increased so that she could not swallow water and had been fed per rectum for two weeks. Attempts at swallowing fluids produced a regurgitation through the nose, coughing and all the other phenomena that accompany the entrance of a foreign body into the larynx. The temperature was normal.

Physical examination showed an emaciated, elderly, very weak woman in bed. The heart and lungs were negative. The voice was thin and weak. Blood pressure: diastolic, 150; systolic, 210 mm. of mercury. Slight ptosis of the left eyelid, contracted pupil (myosis) and enophthalmos were seen. There was no paralysis of the tongue. The left soft palate, the left constrictors of the pharynx and the left vocal cord were paralyzed.

Esophagoscopy was refused. It was impossible to pass a soft stomach tube. However, a stiff oval bougie was passed down the esophagus, encountering some spasm at the cricopharyngeus. The bougie, a No. 30 French, was then passed into the stomach.

The following neurologic report by Dr. George A. Blakeslee of New York is appended: The somatic motor component was normal, that is, there was disturbance in the idiodynamic, reflex or tonic volitional, equilibratory, synergic or associated automatic control of muscles of the body. The twelfth nerve was normal. The somatic sensory component showed marked disturbance, there being complete loss of pain and temperature sensibility on the right side of the body. The face was normal above the interauricular line. There was no disturbance in the affected areas in the vibratory sense. The left side of the body was normal. The splanchnic motor component showed paralysis of the left soft palate and left vocal cord. The splanchnic sensory component was normal.

The Wassermann reaction was negative.

Diagnosis: Syndrome of Avellis and the syndrome of Horner.

Within a few hours after the passage of the bougie, a soft stomach tube was passed and the patient was fed by gavage for nearly ten days. General treatment directed to the high blood pressure was instituted, and she gradually made a slow recovery within a period of six months.

CASE 2.—Mrs. K., a Jewess, aged 58, was seen on the Otolaryngological Service, Bellevue Hospital, in August, 1922.

A summary of the previous history of the patient was entirely negative, except she had had high blood pressure for the previous six months.

Ten days previous to admission the patient developed considerable difficulty in swallowing, and noticed a marked change in the voice.

Physical examination showed a thickset, short woman, rather aged in appearance. The voice was thin and weak. Attempted swallowing of a glass of water produced regurgitation of the fluid through the nose, and was accompanied by a severe coughing and strangling attack. The heart and

lungs were negative. Blood pressure: diastolic, 150; systolic, 220 mm. of mercury.

There was no ptosis and no paralysis of the tongue.

There was paralysis of the soft palate on the left side and also of the left vocal cord and left constrictors of the pharynx. An esophagoscopy was done, and a definitely marked spasm of the cricopharyngeus muscle was seen. This was gradually overcome, and the esophagoscope was passed down into the stomach. The tonicity of the esophagus, laterally, on the left side seemed to be impaired.

A neurologic examination showed the somatic sensory component on the right side of the body disturbed, in that there was complete loss of pain and temperature sense below the interauricular line. The left side of the body was normal. The twelfth nerve was normal. The somatic motor component was normal.

The splanchnic motor component showed paralysis of the left soft palate, vocal cord, partial paralysis of the pharynx and esophagus. The splanchnic sensory component was normal. The Wassermann test was negative.

Diagnosis: Syndrome of Avellis.

This patient was inadvertently transferred from Bellevue and was completely lost track of.

Case 3.—For the detailed history of this case I am indebted to Dr. G. J. Coffin.

The patient was referred by Dr. L. A. Coffin to the Bronchoscopic Clinic of the Manhattan Eye, Ear and Throat Hospital.

The family and past history were negative.

Four days previous to admission in March, 1924, the patient became unconscious and remained so for about one hour. On regaining consciousness, her speech was noticeably thick and difficult to understand. It was found that she had considerable difficulty in swallowing. There was also some vertigo. Her mentality was unimpaired.

Physical examination showed a thickset, short, stout woman, aged in appearance. The pupils were equal and regular, and reacted to light and in accommodation. There was no ptosis. Attempts at swallowing a glass of water produced regurgitation through the nose, coughing and strangling.

The heart and lungs were negative.

Blood pressure: systolic 190 mm. of mercury.

There was no paralysis of the tongue, although at times it appeared as though the tongue deviated to the right.

Paralysis of the soft palate on the left side, partial paralysis of the constrictors of the pharynx, paralysis of the left vocal cord. An esophagoscopy showed considerable spasm of the cricopharyngeus on the right side. This was easily overcome and the instrument was passed into the stomach. The same phenomenon was encountered in Case 2, that is, the tonicity of the left lateral aspect of the esophagus was impaired.

The somatic sensory component on the right side of the body below the interauricular line showed marked disturbance, in that there was complete loss of pain and temperature sense. The left side was normal.

There was a possibility that the twelfth nerve showed some disturbance.

The somatic motor component was normal.

The splanchnic motor component showed paralysis of the left soft palate, left partial paralysis of the constrictors, paralysis of the left vocal cord and the left side of the esophagus.

The splanchnic sensory component was normal. The Wassermann test was negative.

Diagnosis: Syndrome of Avellis.

This patient is slowly recovering under treatment directed to the circulatory system. Her voice is much better and most of the symptoms have disappeared.

The diagnosis of this syndrome is based essentially on the following clinical manifestations:

1. Paralysis of the soft palate, partial paralysis of the constrictors of the pharynx, paralysis of the vocal cord and partial paralysis of the esophagus. These paralyses are ipsilateral to the lesion.

2. Contralateral loss of pain and temperature sensibility of half of the body below the interauricular line.

3. The retention of all other somatic types of somatic sensation in the areas showing defects in pain and temperature sensibility.

4. Chronic endarteritis.

5. The absence of all other symptoms, that is, motor and sensory disturbances.

COMMENT

From the sudden onset and the combination of symptoms, the diagnosis was easily arrived at, especially after consultation with the neurologist.

In the first patient there was some doubt in my mind regarding the condition in the esophagus. A small stomach tube could not be passed beyond the cricopharyngeus. A larger and stiffer one was tried, but with negative results. Esophagoscopy having been refused, an oval bougie was passed beyond the cricopharyngeus, resulting in the distinct sensation of a spasm of this muscle. Immediately following, a soft stomach tube was easily passed and the patient was fed this way for about ten days, when she was able to eat without any trouble.

In the other cases, by means of the esophagoscope, the condition of semiparalysis of the esophagus was noted, as well as the spasm of the cricopharyngeus on the side opposite the paralysis of the vocal cord. Both of these patients were able to swallow water immediately after the esophagoscopy. This procedure was done without an anesthetic.

All these patients were women, past middle life, and most of the symptoms cleared up in from three to twelve weeks. The pain and temperature changes, due to the spinal fillet involvement, have not entirely cleared up in the first case, even after two years.

ETIOLOGY

It would seem that the esophageal findings were the cause of the difficulty in swallowing, and that the mere dilatation of the cricopharyngeus permitted these patients to swallow voluntarily.

An anatomic and pathologic analysis of the focus of the lesion is given by the simultaneous involvement of the nucleus ambiguus, which supplied the soft palate, larynx and esophagus and the spinal fillet.

In the lateral white columns of the medulla, these two elements lie close together, so that a small lesion might involve both. The cause is hemorrhage from one of the radicular branches of the posterior inferior cerebellar artery into the immediate neighborhood of these structures. Thus there is a consequent impairment of conduction in the spinothalamic tract and an impairment of the nucleus ambiguus. Evidence of a circumscription of the lesion is afforded by the absence of all the other cranial nerves and by the fact that none of the pathways, either somatic motor or somatic sensory conduction, is affected.

VARIATIONS OF THE SYNDROME

Variations of this syndrome depend on lesions involving structures dorsally and ventrally, and are recognized as: 1. The syndrome of Schmidt—the syndrome of the nucleus ambiguus and the nucleus accessorius, in which there is a lower motor neuron paralysis of the sternocleidomastoid and a paralysis of the vocal cord. 2. The syndrome of Jackson—the syndrome of the nucleus ambiguus and the nucleus hypoglossus, in which there is a lower motor neuron paralysis of the vocal cord, half of the tongue and half of the soft palate. 3. The syndrome of Tapia—the syndrome of the posterior inferior cerebellar artery, in which there is swaying and lateropulsion to the right, loss of sensibility of the right side of the face, and loss of, or decrease in, pain and temperature sensibility on the left side, this description being for a right-sided lesion in the medulla. There is also paralysis of the right half of the soft palate and of the right vocal cord, and a conjugate deviation of the eyes. In this lesion there is an involvement of the spinocerebellar, the spinothalamic and the descending trigeminal tracts, together with the nucleus ambiguus and the vestibular nuclei, the syndrome of the nucleus ambiguus, and the nucleus hypoglossus, in which there is a lower motor neuron paralysis of the vocal cord, half of the tongue and half of the soft palate. There is an absence of all other motor and sensory symptoms. The lesion in all three of these syndromes is ipsilateral.

In the differential diagnosis it is necessary to differentiate hysteria, labioglossopharyngeal paralysis, syringomyelia, tabes, lateral sclerosis, general paralysis, gummas, post-typhoid and diphtheritic paralysis, also other lesions in the neighborhood of the nucleus ambiguus. Recurrent paralyses due to lesions in the neck, jugular foramen syndrome, typhoid and malignant disease, post-thyroidal operations, carotid tumors, aneurysms, lesions of the mediastinum, pulmonary lesions of the apex, pleuritic thickenings, mitral stenosis, pericarditis, syphilis and trauma, such as stab or gunshot wounds.

CONCLUSIONS

Given a patient, with a high blood pressure, past middle life, in whom there is a sudden onset of symptoms such as described, that is, a sudden change in voice accompanied by difficulty in swallowing, coupled with the physical signs noted, one should consider the possibility of the lesion being in the medulla in the place described.

However, there have been some cases of this condition reported in young children, so that age should not be one of the cardinal signs.

A competent neurologist will be of material assistance in diagnosing the condition.

Usually, these patients do not succumb to the primary lesion, but partially recover.

STAPHYLOCOCCUS SEPTICEMIA SECONDARY TO MASTOIDITIS AND SIGMOID SINUS THROMBOSIS

OPERATION AND RECOVERY: REPORT OF CASE *

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A boy, aged 5 years, was admitted to the Mayo Clinic, March 23, 1924. Early in February he had had measles. A week later he began to have pain in both ears, and at the end of four days both drums ruptured spontaneously. The right ear stopped discharging in two days and began to pain again, rupturing after a few hours. During this time the temperature was elevated somewhat, but the parents did not know how much. Mastoid pain was considerable. Both ears continued to discharge and the temperature remained high. After three weeks a bilateral mastoid operation was done; following this, chills and a septic type of temperature developed. At one time the temperature was 107.4 by rectum; it remained above 102. The child became greatly emaciated, and very intractable. The home physician wanted to give a transfusion, and operate again on the mastoids. This was refused and the child was brought to the Clinic.

The patient was emaciated, pale and exhausted. His temperature was 101 F. and pulse 110. Both ears were discharging profuse yellowish stringy pus. Both mastoid wounds were open and discharging; neither sinus could be seen or felt. The nose was normal. There was evidence of a peritonsillar infection on the left side, and of bilateral cervical adenitis, more pronounced on the left side. Pressure over each jugular vein produced no change in the ophthalmoscopic picture. Blood culture disclosed many gram-positive staphylococci. A transfusion of 400 c.c. of citrated blood and 100 mg. of gentian violet was given. The temperature then rose to 104.8 by rectum for twenty-four hours. Both mastoids and the jugular veins were explored. The right side was normal; the left side was thrombosed, and free pus was found in the jugular bulb. The sinus was ablated and the jugular vein sectioned above the facial vein. Another culture was made from the blood taken at operation and proved to be positive, with many gram-positive staphylococci. One hundred milligrams of gentian violet was given intravenously at the time of the operation. The temperature became much lower, but was still septic in type. On the eighth, tenth, twelfth and fourteenth days after the operation the child had a chill with a rise in temperature. From then on the convalescence was satisfactory. He began to gain weight and look bright. He was dismissed from observation twenty-seven days after admittance, having gained 20 pounds (9 kg.). Both ears were dry, and there was but a slight discharge at the lower angle of the mastoid wound.

COMMENT AND CONCLUSIONS

1. The finding of the staphylococcus in the blood stream is rather unusual; not many such instances are reported. The general opinion

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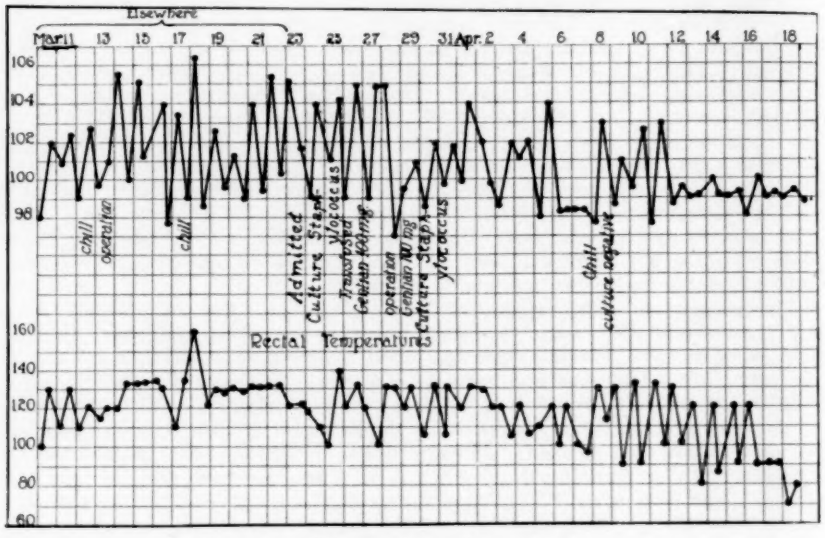
is that such a condition adds greatly to the danger. Other cases of sinus thrombosis have been handled in the same manner except that the gentian violet was not used in conjunction with the transfusion, but the transfusion was used as a supportive measure. It would be difficult to determine what effect the gentian violet really had, although in a staphylococcus infection it is believed to be most effective. Because of the extreme intractibility of the patient and the fact that he was very ill, it did not seem best to have daily blood cultures made in order to learn at what period in the convalescence the blood became normal.

2. The patient's symptoms had continued for about six weeks, and he appeared extremely ill. With both ears and mastoids involved, it



Temperature chart.

was difficult to ascertain the exact condition of either sinus. Crow's sign did not help. There were a few more nodes on the left side than on the right. It was suggested that the jugular veins might be exposed on both sides and that the condition above the vein might be determined by their appearance. Therefore, the right jugular vein was exposed and found to be in good condition. The mastoid and sigmoid sinuses were exposed, with negative findings. The source of the infection was then found in the left sigmoid sinus and was taken care of in the usual manner. In a previous case of bilateral involvement, small shotty nodes had been found, the disease being on the side on which the nodes were more pronounced. The condition was not cervical adenitis in either case.

3. As the child's general condition improved, his disposition changed greatly and he again became quite tractable.

4. The cause of the chills on the eighth, tenth, twelfth and fourteenth days was not apparent, but they no doubt were due to bacterial invasion in the blood stream from some nidus of infection, probably not from the sinuses. It is reasonable to assume that small secondary foci were situated in other places in the body, although they were not found.

RADIUM EMANATION IN CARCINOMA OF THE LARYNX*

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Radium undoubtedly will retard (or even entirely destroy) the growth of malignant tumors, and has proved its worth particularly in the superficial and accessible types of neoplasm. Up to the present time, its use in the larynx has been disappointing, in spite of its brilliant promise at the start, for reasons which will be elaborated later.

A review of some of the more recent reports demonstrates only a meager percentage of probable cures. Quick and Johnson [1] report a series of 156 cases. Taking their most favorable group, numbering twenty primary intrinsic operable cases, we find seven patients (35 per cent.) free from clinical evidence of the growth for periods ranging from eight months to three and a half years. Their next group, of fifty-one inoperable but intrinsic cases, yielded eleven patients, including two with malignant granulomas (21 per cent), who showed improvement for periods of from six months to two years; and seven (14 per cent.) who were improved for six months to two and a half years and then suffered a relapse. Of eight inoperable cases with glandular involvement, seven were unimproved. Considering their extrinsic cases, we find one group of thirty patients without glandular involvement and another of fifty-five with glandular invovement. In the former group, four (13 per cent.) were free from clinical evidence of the growth for periods of from fifteen months to two years. In the latter group, two (4 per cent.) were free from evidence of the disease for ten to twelve months, and twelve (22 per cent.) showed improvement for four to twelve months.

Pinch,[2] in his report from the Radium Institute of London for 1922 and 1923, cites a total of twelve carcinomas of the larynx with five (40 per cent.) improved. The duration of the period of relief and the incidence of recurrence are not noted.

In the early days of radium therapy, malignancy in the larynx was attacked by means of needles containing from 10 to 20 milligrams of the salt, several of which were imbedded in the affected tissues and left in place as long as the patient would tolerate them. This might be anywhere from one to twelve hours. It was soon found, however, that this

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* Candidate's thesis accepted by the American Laryngological, Rhinological and Otological Society.

1. Quick, D. A., and Johnson, F. M.: Am. J. Roentgenol. **9**:599 (Sept.) 1922.

2. Pinch, A. E. H.: Radium **2**:39 (April) 1923 and 1924.

procedure was not only inadequate but harmful. The dosage that could be employed was entirely too small, the trauma produced by the needles in the delicate intralaryngeal tissues was formidable and there was always the danger of opening up new avenues for extension into the healthy tissues. An extreme case of this type was a patient in whom we saw a general carcinosis develop within one week from the time the needles were inserted.

Another method of application was to place a 50 mg. tube within a lead capsule attached to a tracheotomy tube (already in situ), leaving it within the larynx for twelve to eighteen hours. A similar method is still in vogue immediately following the operations of laryngofissure or hemilaryngectomy. This also proved to be inadequate.

When radium emanation came into vogue, it was heralded as a great advance in therapy because of the ease of its application and the greater concentration of dosage in a small area. Otto T. Freer [3] was one of the first to employ emanation in the larynx and to devise an ingenious radium carrier attached to an adjustable headpiece, by which it was possible to introduce a silver screen holding from 2 to 6 emanation tubes with a possible maximum dosage of from 500 to 1,000 millicuries. It was my privilege to be associated with him in this work, to have seen his patients, and later to have treated a number of them when illness forced him to relinquish the task, and it is on our experience with this series of cases that these comments are based.

In the beginning we used comparatively small doses (from 75 to 150 millicuries for one hour), repeating the irradiation within from a few days to a week, and giving a third, and often a fourth, exposure at like intervals if the case seemed to warrant it. Thus, a total of from 400 to 700 millicurie hours were given within a period of two weeks, supplemented in some instances by overnight irradiations from the outside. In the majority of instances the records show that the lesions disappeared within a month or two after the radium reaction had worn off. It was frequently astonishing to note how completely a fungating neoplasm would melt away as if by magic, leaving normally appearing vocal cords with restoration of function. Freer's [3] report of thirty-two cases of all degrees showed a clinical recovery in fourteen patients, after deducting three that were practically moribund when first seen. In the majority of instances, however, these cures were only apparent, as subsequent investigation in the follow-up revealed. Within a few months, we found that recurrences were manifesting themselves, and then when additional radium treatments were given it was discovered that fewer responded favorably than in the first instance.

3. Freer, O. T.: Carcinoma of the Larynx Treated Locally with Radium Emanation, J. A. M. A. **79**:1602 (Nov. 4) 1922.

RESULTS

Our records show that of forty cases of all types receiving their first series of irradiations, twenty-two patients (54 per cent.) were clinically free from evidence of the disease for an average period of eight and one-half months. Of sixteen receiving their second series of treatments (namely, following the recurrence), eight (50 per cent.) were clinically free from evidence of the disease for an average of eight months. Six patients who showed a second recurrence were irradiated for the third time, and only two of these (33 per cent.) were free from evidence of the growth for an average of two months.

METHOD OF TREATMENT

It was argued from a study of these cases that if the initial treatments could so effectually clean up the growth, the recurrence must have been due to deeper nests of cells which were not reached, and that subsequent treatments were ineffectual because the cancer cells had become more resistant to the emanation, while the normal tissues had become more sensitive. We therefore concluded that the initial dose had been inadequate, and decided to attack the neoplasm more boldly from the start. We thought that one powerful exposure at the outset would do away with the necessity for repeated irradiations, and would be sufficient to destroy the growth before the normal cells became sensitized to the radium.

This, in turn, did not work out as anticipated. We would see the neoplasm melt away, as anticipated; then, following within a month or two after the subsidence of the initial reaction, a secondary reaction, more severe than the former, would take place, leading to a breaking down of the healthy structures, from which the patient could not recover.

It must be remembered in this connection that the laryngeal box, while for a long time barring the spread of the cancer to the lymphatic structures of the neck, is nevertheless made up of tissues the resistance of which is comparatively low to infection. Cartilage is dependent almost entirely on its perichondrial covering for nourishment, and when this covering is attacked and its vitality impaired, the cartilage is likely to die *en masse*. Limited areas of necrosis, such as occur in bone when the periosteum is infected, are much less frequent in cartilage in the presence of a well marked perichondritis. This is particularly true of the perichondritis which follows the marked lowering of resistance due to the influence of radium. The lymphatics within the laryngeal box are sparse, and when the vessels become thrombosed from the effects of the radium there is very little local resistance to the secondary infection which is always in the offing. The results then are as follows:

There is great swelling and edema of the soft parts. The perichondritis leads to arthritis of the movable cartilages. Great pain follows. The patient is unable to eat or sleep. Constitutional resistance is greatly undermined, thus paving the way for increased activity of pyogenic organisms. Tracheotomy is inevitable. Suppuration follows, with formation of fistulas. Eventually the cartilages may slough out and if the patient has sufficient resistance, healing will take place with the formation of cicatricial webs or deformities. Two patients of this type were Cases 33 and 34. In the former, the arytenoids and the cricoid sloughed out entirely, the larynx healed completely and every trace of the carcinoma disappeared; yet the patient died of inanition, because it was impossible for him to swallow without projecting the food into the larynx. Tube feeding was inadequate and operation was refused. In the other patient, the first two tracheal rings and the greater part of the cricoid sequestrated and were coughed out, with a resulting subglottic cicatricial web formation that caused respiratory difficulty and interfered with the expulsion of mucus. The web was dilated and a portion excised. Histologic examination failed to disclose any remaining carcinoma; yet the patient succumbed.

One patient (Case 10), who had been entirely free from all evidences of the carcinoma for twenty months, developed a recurrence and was given one irradiation of 437 millicurie hours. She developed a secondary reaction that lasted for nearly ten months, during which time an external fistula appeared, discharging pus to the end. Undoubtedly there was dead cartilage present.

In another (Case 24), a recurrence following a previous thyrotomy, the patient was given one treatment of 928 millicurie hours with a brilliant primary result, the mass having disappeared completely down to a scar replacing the missing vocal cord. Yet a marked perichondritis ensued within a few months, which up to the present time (ten months after the treatment) is still active. The patient is a comparatively young man (39), of vigorous build, and seems to be successfully combating the infection.

These cases are, of course, exceptional but they serve to demonstrate the possibilities and dangers of heavy concentration of radium within the larynx, as well as the diminished resistance to radium in a larynx that has been previously irradiated.

We are, therefore, confronted with a dilemma: On the one hand, smaller doses with almost certain recurrence; on the other hand, larger doses with severe local and constitutional disturbances, such as the average patient is unable to overcome. There is no question that the large concentration will accomplish results, but the whole difficulty lies in the means of shielding the unaffected structures. It is almost impos-

sible to screen the emanation sufficiently to prevent the action of the softer rays, on account of the extremely narrow space in which we must work. Even in those cases in which the patient breathes through a tracheal opening, we find that the glottis is narrowed by swelling and by the neoplasm to a point where the greatest width is only a few millimeters. For the same reason, it is almost impossible to place the screen at a sufficient distance from the area to be irradiated, as is done in lesions on the surface of the body or in larger and more spacious cavities.

Recently, the implantation of bare emanation tubes, containing from 0.5 to 1 millicurie each, into the neoplasm itself has come into vogue and in some quarters is practically the only method of intralaryngeal irradiation employed. Our experience with this method of treatment (supplemented by extensive external irradiations) has been limited to lesions of the tongue, pharynx and extralaryngeal structure, and, in the main, results have been encouraging. We can cite the case of several patients with extensive carcinomas of the base of the tongue and tonsillar regions which yielded clinical cures for periods of from six months to a year and which at the present writing are still free from recurrences. Simpson [4] has reported splendid results in carcinomas of the tongue treated by implantation. In fourteen consecutive cases, eight patients (60 per cent.) were clinically well for periods of from one month to nearly two years. Three additional patients were expected to recover, and three were probably fatally ill. This series has been augmented, and at the present writing Simpson can show an even higher percentage of recoveries for much longer periods.

Quick's [5] results in malignancy of the tonsil, admittedly a most unfavorable location, are also extremely hopeful. His series of 124 cases shows a clinical recovery in twenty-eight patients (23 per cent.) for periods averaging twenty-six months. Twenty patients were still under treatment and progressing favorably.

IMPLANTATION RESULTS

These reports, and others, strongly support the wisdom of this method of treatment. There are some drawbacks, however, to the implantation of bare tubes in the larynx which should be mentioned. First, the operation must be done by the direct route with any of the well known spatulas or the suspension apparatus. This is frequently made difficult by infiltration of the epiglottis and supraglottic structures. Second, there is danger in such cases of inciting the growth through undue trauma in the effort to gain adequate exposure of the parts.

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4. Simpson, F. E.: Chicago Med. Rec. (Jan.) 1923; ibid., Illinois M. J. **44**:139 (Aug.) 1923.
5. Quick: Radium **2**:97 (July) 1923.

Third, there is the danger of sloughing out of one or more of the tubes with a resulting inhalation pneumonia or lung abscess. Such a case was cited by Jackson at the Washington session of the American Academy of Ophthalmology and Otolaryngology in 1923. Nevertheless and despite these objections, the method has much to commend it. We may list the advantages thus: First, generally only one implantation is necessary, provided external irradiations are employed at the same time. Second, there is less danger to the cartilages, as the dose implanted is very small and its action limited to the immediately adjacent tissues. Third, for the reason just mentioned, the healthy side of the larynx is more adequately protected than by any other method.

Comparing it, however, with the Freer method, we find that the latter possesses certain advantages over the former which must not be overlooked. First, the application is done under local anesthesia without local trauma. Second, the dosage can be accurately controlled as to amount and duration of the exposure. Third, in cases in which the lesion is not so extensive and there is room enough, the screen can be covered with rubber tubing, which places the emanation an additional millimeter or two from the exposed tissues and, in addition, helps to filter out the damaging beta rays. Fourth, the screen can be projected below the level of the cords, thus irradiating the subglottic region which has often been proved to be the source of many recurrences. On this point we quote Pancoast [6] who says:

> Subsequent operation in several primarily successful cases has shown an extensive lesion below the cords, part of which was no doubt beyond the range of vision and adequate radiation. The undestroyed portion below the cords has undoubtedly been the most frequent starting point of recurrence.

Coming now to a consideration of our own series of cases, we are naturally appalled by the high percentage of mortality. This fact, if taken alone, would without doubt discredit the treatment and make one pessimistic as to its future. Before leaping to such a conclusion, we must carefully consider the following facts.

LARYNGECTOMY

Cancer, if left untreated, is 100 per cent. fatal. Operative treatment, except in strictly circumscribed intrinsic cases, also offers a bad prognosis with the additional disadvantage of the operative and postoperative suffering. As for the intrinsic cases, we are safe in saying that laryngectomy alone has proved of real curative value. Anything less leads sooner or later to recurrence, with the added distress of the carcinoma breaking through externally. Laryngectomy, on the other hand, is a mutilating operation, entailing the perpetual wearing of a tracheal tube and loss

6. Pancoast: J. Radiol. (Sept.) 1924.

Results of Radium Treatment in Our Series of Cases

No.	Age	Onset of Symptoms	Intrinsic	Extrinsic	Gland Involvement	Intralaryngeal Irradiations	Total Amount Intralaryngeal	Free from Clinical Evidence Carcinoma	Subsequent Laryngeal Irradiation	Result	Complications	End Result	Remarks
1	70	?	Yes	Yes	Yes	4	496 m.c.* hours	4 mo.	4 327 m.c. hours	Free for 15 mo.	Second recurrence. Given 552 m.c. hrs. Disease gone in 2 mo. 5/1/23	.....	.....
2	46	1 yr.	Yes	No	No	3	471 m.c. hours	3 yr.	..	.....	.....	Recovery	Throat completely well at present
3	71	6 mo.	Yes	No	No	4	436 m.c. hours	6 mo.	2 402 m.c. hours	Free for 2 mo.	Recurrence. Given 314 m.c. hours. Carcinoma disappeared for 2 mo.	Died	Slow return of deep infiltration. Exhaustion
4	66	9 mo.	Yes	Yes	Yes	2	208 m.c. hours	.....	..	.....	.....	Died	General condition very poor when first admitted
5	72	5 mo.	Yes	No	Yes	2	150 m.c. hours	.....	..	.....	.....	Died	Condition very bad when first admitted
6	61	4 mo.	Yes	No	No	3	323 m.c. hours	6 mo.	External irradiation only	Free for 3½ yr.	.....	Recovery	Cords slightly pink. Movements good. No infiltration or roughness
7	61	1 yr.	No	Yes	No	3	327 m.c. hours	2 mo.	3 595 m.c. hours	Free for 5 mo.	Recurrence. Given 595 m.c. hours	Died	Growth disappeared after second series but edema persisted
8	55	1 mo.	Yes	Yes	No	6	602 m.c. hours	7 mo.	234 m.c. hours	Lesion clearing up	Gland appeared in February, 1921. Disappeared under external raying. No recurrence	Died of heart disease	.....
9	58	6 mo.	Yes	Yes	Yes	9	815 m.c. hours	.....	..	.....	Continued growth and extension	.....	.....
10	42	3 mo.	Yes	No	No	4	318 m.c. hours	7 mo.	2 268 m.c. hours	Free for 20 mo.	Recurrence. Given 437 m.c. hours	Died 10 mo. later	Last irradiation followed by marked perichondritis. Secondary infection; external fistula
11	64	7 wk.	Yes	No	No	4	814 m.c. hours	.....	..	.....	.....	.....	.....
12	60	1 yr.	Yes	No	No	2	594 m.c. hours	9 mo.	2 435 m.c. hours	.....	.....	Died 2 mo. after last treatment	.....
13	47	6 mo.	Yes	Yes	Yes	1	783 m.c. hours	Lesions cleared up	..	.....	Carcinoma spread to adjacent areas	Died 2 mo. later	.....
14	50	1 yr.	Yes	No	No	4	1258 m.c. hours	.....	..	.....	.....	Died 6 mo. later	.....
15	61	9 mo.	Yes	No	No	3	644 m.c. hours	10 mo.	671 m.c. hours	.....	.....	Died 4 mo. after last treatment	.....
16	47	7 mo.	Yes	Yes	No	2	772 m.c. hours	5 mo.	1 648 m.c. hours	.....	.....	Died 2 mo. after last treatment	Carcinoma originated in a persistent thyroglossal duct
17	54	1 yr.	Yes	Yes	No	1	300 m.c. hours.	.....	..	.....	.....	Died	No information as to local effect of radium. Thyrotomy done 4 months previous
18	65	8 wk.	Yes	Yes	No	2	495 m.c. hours	3 mo.	..	.....	Developed gland involvement and local recurrence	Died 13 mo. after first treatment	.....
19	73	6 mo.	Yes	No	No	2	484 m.c. hours	32 mo.	..	.....	.....	Recovery	Living and well. Fixation one vocal cord

20	71	2 yr.	Yes	No	No	2	572 m.c. hours	.....	..	.....	.....	Died 7 mo. after first treatment	.....
21	72	?	Yes	Yes	No	4	484 m.c. hours	2 mo.	1 246 m.c. hours	.....	Developed gland involvement	Died 9 wk. after last treatment	.....
22	52	3 mo.	Yes	Yes	No	2	401 m.c. hours	2 mo.	1 220 m.c. hours	.....	Developed gland involvement	Died	.....
23	60	10 mo.	Yes	No	No	3	481 m.c. hours	2 mo.	1 200 m.c. hours	Free for 3 mo.	.....	.....	.....
24	38	1 yr.	Yes	No	No	1	928 m.c. hours	4 mo.	..	.....	Patient had marked perichondritis; subsiding	Living 1 yr. later	Thyrotomy done 1 year ago. Recurrence led to taking up radium treatment
25	65	3 mo.	No	Yes	Yes	1	700 m.c. hours	.....	..	.....	.....	Died 5 mo. later	.....
26	52	4 mo.	No	Yes	Yes	2	452 m.c. hours	.....	..	.....	Mass disappeared but one vocal cord remains fixed	Died	.....
27	58	8 mo.	Yes	No	No	1	352 m.c. hours	.....	..	.....	.....	.....	Thyrotomy done 3 mo. ago, followed by recurrence
28	52	? mo.	Yes	No	No	4	848 m.c. hours	.....	..	Temporary improvement then slow progression	.....	Died 10 mo. after first treatment	A very resistant squamous cell carcinoma with deep infiltration
29	58	9 mo.	Yes	No	No	1	1750 m.c. hours	.....	1 302 m.c. hours	.....	.....	.....	Thyrotomy done 4 mo. ago, followed immediately by first radium treatment
30	48	2 yr.	No	Yes	Yes	1	435 m.c. hours	.....	..	.....	.....	Died 5 mo. later	.....
31	58	9 mo.	Yes	Yes	Yes	3	712 m.c. hours	.....	..	.....	Marked perichondritis	Died 6 mo. after first treatment	.....
32	49	8 mo.	Yes	No	Yes	2	612 m.c. hours	.....	..	.....	.....	Died 9 mo. after first treatment	.....
33	48	8 mo.	Yes	Yes	Yes	4	1056 m.c. hours	Lesions entirely disappeared	..	.....	Perichondritis, necrosis, sequestration cricoid cartilage. Surfaces healed	Died of inanition	Muscles lost with cartilage; unable to swallow. Artificial feeding
34	55	6 wk.	Yes	No	No	2	460 m.c. hours	20 mo.	1 480 m.c. hours	Lesion disappeared	Perichondritis, necrosis and expulsion two tracheal rings, part of cricoid. Healing with stenosis	Died of exhaustion	Stenosis dilated. Specimen removed revealed no trace of remaining carcinoma
35	52	3 mo.	Yes	Yes	No	2	1425 m.c. hours	.....	..	.....	.....	Died 5 mo. after first treatment	.....
36	59	10 mo.	Yes	No	No	3	407 m.c. hours	.....	3 mo. later 305 m.c. hours	.....	.....	Died soon after last treatment	Developed pneumonia
37	56	6 mo.	Yes	Yes	Yes	5	848 m.c. hours	.....	..	.....	Metastases in joints	Died	Glands removed 6 weeks prior to first raying
38	59	?	Yes	Yes	No	3	442 m.c. hours	19 mo.	..	.....	Glands involved 10 months after first treatment	Died	.....
39	71	? mo.	Yes	No	No	4	496 m.c. hours	4 mo.	2 627 m.c. hours	Free for 12 mo.	Because of suspicious nodule, 522 m.c. hours intralaryngeal. Two treatments. Nodule disappeared	Died 2 yr. later	Myocarditis and recurrence of carcinoma
40	66	1 yr.	Yes	No	No	1	600 m.c. hours	All visible evidence of carcinoma gone in 6 months	..	.....	Moderate perichondritis with intralaryngeal slough	Living 6 mo. later	Slight edema still present. Patient in good general condition

* Millicuries.

of the speaking voice. But even granting the superiority of laryngectomy over other methods of treatment in favorably selected cases, we are left with the large class of cases in which the growth is supraglottic, partially extrinsic and complicated with glandular involvement. Such patients are all bad surgical risks, and even though here and there one survives with a primary cure, the ultimate result is recurrence or death from intervening complications.

COMMENT

The great difficulty in drawing conclusions as to the value of a given method of treatment in carcinoma is in the fact that end-results are so infrequently noted. Carcinoma of the breast or uterus is never considered cured unless the patient is free from clinical evidence of the disease for at least five years. It is easy enough to claim a primary or postoperative cure and let it go at that. We realize how difficult it is to keep in touch with these patients for any length of time after they have left our hands. The patient, when last seen, was free from evidence of the carcinoma and we assume he is cured, at least temporarily; yet in many instances, when a recurrence does take place, it finds the patient in the care of some other laryngologist at a remote point. It is safe to say that practically every case reported as "lost track of" under the five-year period is a recurrence and an ultimate carcinoma fatality. We have made every effort in our series to obtain information as to the ultimate outcome of the treatment, and have succeeded in all but six. As a result, we have had to record fatalities where primary cures had previously been noted. This on superficial observation may not reflect great credit on our treatment; nevertheless it is of the highest scientific import, and, far from discouraging us, only serves to stimulate our researches into the causes of the failures, as well as the temporary successes which manifested themselves during the treatment. Five of our patients are living today. One (Case 2), a woman, aged 49, a proved case of intrinsic epithelioma, who was treated three years ago, is alive and well with a normally appearing larynx and a wonderful speaking and singing voice. Another (Case 6) is completely well three and one-half years after his treatment. His larynx is entirely free from evidence of disease, except for the slightest discoloration of one vocal cord. His voice is slightly hoarse. Yet another (Case 19) is completely well two years and eight months after his last radium treatment. His voice is impaired on account of fixation of one vocal cord, but there is no evidence of the growth. Another patient (Case 24) is slowly recovering from a severe perichondritis and shows no clinical evidence of carcinoma ten months after his treatment. Another (Case 40) is free from evidence of the malignancy six months after the irradiation, but this case is too recent for any further comment.

CONCLUSIONS

The numerous primary results shown in our cases (55 per cent.) are too impressive to be lightly passed over. When, time and again, one has seen extensive lesions disappear completely, leaving normally appearing intralaryngeal structures, one must necessarily have a great deal of respect for the agent that can accomplish such wonders. Later, when the patient returns with a recurrence after a lapse of months, heart breaking though it may be, one cannot help but feel that it is due not to the inadequacy of the agent but rather to insufficient knowledge in its application. Our views on the subject are constantly changing as our experience grows, and though the outlook is still dark we refuse to yield our optimism. There must be a happy medium somewhere between the minimum dose, which either stimulates or else temporarily inhibits the growth, and the maximum dose, which in destroying it at the same time devitalizes the adjacent normal tissues. Only when this question of dosage, as well as the all-important one of exact screening for the peculiar structures on which we work has been solved, may we expect to see our percentage of recoveries rise and permanent cures recorded.

25 East Washington Street.

Clinical Notes

AN ATTACHMENT FOR THE ELECTRICAL OTOSCOPE

WITH WHICH THE EAR MAY BE EXAMINED BY TWO OBSERVERS AT THE SAME TIME *

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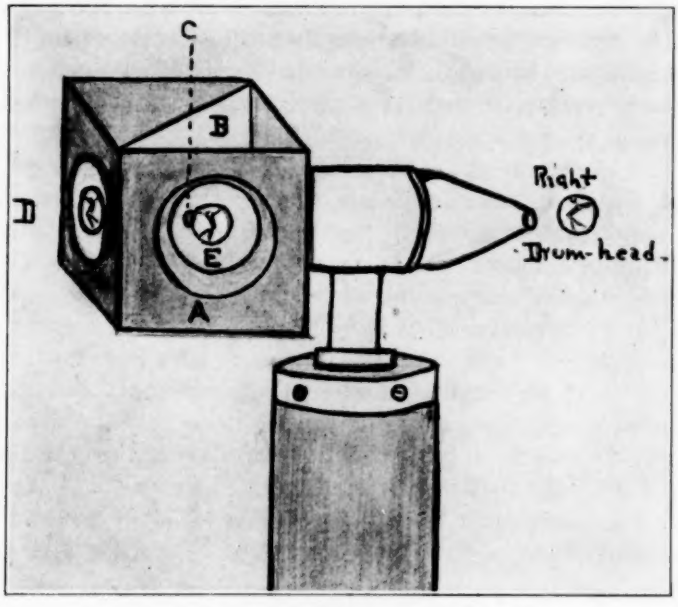
It is always a satisfaction to a teacher to feel sure that a student is at least seeing what is being pointed out to him. The simple attachment to a well-known electrically illuminated magnifying otoscope, here shown, assures



The attachment for the electrical otoscope

the instructor that the student must see what he wishes him to see; it obviates a faulty position of the ostoscope when the instructor must move out of the line of vision to allow the student to look; and it makes it possible to show a condition to a number of men, one after the other, with little manipulation and with the minimum of discomfort to the patient.

The rough sketch is almost self explanatory. *A* is a small square box containing a mirror (*B*) set at an angle of 45 degrees. The box has three openings,

* The model described is an attachment; a new model is under consideration embodying the construction of a new otoscope.

one for the attachment of the lens end of the otoscope, one facing the mirror and one in the end opposite the otoscope. The mirror has a 3 mm. hole (*C*) scraped in its silvering, slightly off center, so that it does not interfere with the reflected image; one who is familiar with the use of the otoscope has no difficulty in obtaining a full magnified view of the drumhead through this opening, if the eye is brought close to the instrument at *D*. The student, standing to the side, sees the same picture at *E*, though reversed in position. The reversal of the image is of some disadvantage, but when explained is readily grasped, and the instructor should word his descriptions to apply to the picture as seen by the student.

PROGRESS IN OTOLARYNGOLOGY

A Summary of the Bibliographic Material Available in the Field of Otolaryngology

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PERORAL ENDOSCOPY

A CRITICAL REVIEW OF THE LITERATURE

LOUIS H. CLERF, M.D.

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During the last few years, marked advances in the field of bronchoscopy and esophagoscopy have been observed. These methods, originally perfected for the removal of foreign bodies in the air and food passages, have greatly increased their scope of usefulness. Many important contributions have been added in the diagnosis and treatment of diseases of the respiratory tract and food passages, so that today, the foreign body phase constitutes but a small part of the work of the bronchoscopist and esophagoscopist.

Blind methods of diagnosis and treatment of esophageal disease are being slowly replaced by the more scientific methods of direct inspection. It is no longer necessary to make an inferential diagnosis of laryngeal disease in children. As stated by Iglauer:[1] "A direct examination of the larynx, will, in most cases, almost certainly determine the true diagnosis."

FOREIGN BODIES IN THE AIR AND FOOD PASSAGES

A number of excellent articles bearing on the symptomatology and diagnosis of foreign bodies in the air and food passages have appeared in the literature. In a very comprehensive presentation of this subject by McCrae,[2] the symptomatology is discussed in detail. The physical signs produced by the various kinds of foreign bodies are considered and interpreted. He believes that bronchial foreign bodies are more common than is generally believed. The diagnosis is not difficult if there is a definite history of choking while an object was held in the mouth. However, so often there is an absence of symptoms at the time of aspiration, or, if present, they are overlooked. The symptoms and physical signs vary with the position, shape, size and character of the foreign body. These often vary from hour to hour. The age of the patient and the

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1. Iglauer, Samuel: The Relation of Bronchoscopy and Esophagoscopy to Surgery and Medicine, Laryngoscope **34**:83 (Feb.) 1924.

2. McCrae, T.: Lumleian Lectures, Lancet **1**:735 (April 12) 1924; ibid. **1**:787 (April 19) 1924; ibid. **1**:841 (April 26) 1924.

duration of the foreign body sojourn also greatly influence the findings. The symptomless interval following the initial symptoms is responsible for some of the errors in diagnosis. Bodies of vegetable origin produce severe symptoms in the young. These cases are often confused with diphtheria or pneumonia and require careful study of the history, symptoms and clinical findings. Although roentgen-ray diagnosis is invaluable in opaque foreign bodies, it is possible by careful study of the changes in the lungs and surrounding structures during inspiration and expiration accurately to localize cases of nonopaque foreign bodies. Cases of long duration are often confused with pulmonary tuberculosis and bronchiectasis. They must also be differentiated from foreign bodies in the esophagus, bronchial neoplasm, enlarged mediastinal glands and aneurysm. Spontaneous expulsion of foreign bodies occurs in about 2 per cent. of cases. The mortality rate in cases of bronchoscopic removal is about 1 per cent. The age of the patient, character of the foreign body and duration of sojourn influence the outlook. Every foreign body should be removed. Inverting the patient is contraindicated because of the danger of asphyxiation due to impaction of the foreign body in the glottis.

Rowland [3] has observed that the higher the location of the foreign body in the air passages the more marked are the symptoms while the lower down it is the more pronounced are the physical signs. He emphasized the need of careful study of the history, symptoms, physical signs and roentgen-ray findings. A fuller appreciation of these facts will aid in correct diagnoses. He believes that endoscopy should be done in every case of suspected foreign body.

Bulson [4] emphasizes the need of obtaining a complete history in foreign body cases, including the details of the accident and the occurrence of symptoms. A duplicate of the foreign body should be obtained if possible, in order that the mechanical problems of removal can be studied better.

It is being more generally recognized by the medical profession that foreign body cases should be subjected to careful physical examination and roentgen-ray study whenever possible, before attempts are made at endoscopic removal. McReynolds,[5] in a report of eleven cases, points out the absolute necessity for careful physical examination and roentgen-

3. Rowland, R. S.: Foreign Bodies in the Air and Food Passages of Infants and Children, with Especial Reference to the Clinical Diagnosis, Am. J. Dis. Child. **28**:183 (Aug.) 1924.

4. Bulson, E. L.: Foreign Bodies in the Air Passages. Diagnosis and Localization, J. Indiana M. A. **17**:103 (April) 1924.

5. McReynolds, G. S.: Report of Cases of Foreign Bodies in Lungs and Esophagus with Special Reference to Points of Diagnosis, Texas State J. Med. **20**:284 (Sept.) 1924.

ray study in all cases of suspected foreign body, also that removal of the foreign body should not be undertaken with undue haste.

Greene [6] shares the views of all the leading bronchoscopists that bronchoscopy for foreign body should be done in the shortest time possible with a minimum amount of trauma. This is possible only when the operator has provided himself with all possible data regarding the nature, location and position of the foreign body. This can all be obtained by careful preliminary study. Negus [7] has well stated that:

> Whilst some bronchoscopists take a few minutes in preparation and a few hours in manipulation others spend hours or even days in preparation and usually a few minutes or even seconds in instrumentation.

A history of choking, coughing or gagging when a foreign substance was held in the mouth should be considered as positive evidence of a foreign body until proved otherwise. Not infrequently, however, a patient is seen in which these initial symptoms are absent. Ross [8] reports the case of a child, aged 15 months, who developed no symptoms, not even cough after swallowing an open safety pin. Roentgen-ray study demonstrated the safety pin in the larynx, with the point penetrating the posterior wall.

The asthmatoid wheeze first described by Chevalier Jackson is a very valuable sign when present. As stated by Rowland,[3] it is well to remember that a wheeze does not always mean anaphylactic or thymic asthma. This was well demonstrated in the case of a youth, aged 19, reported by Clerf.[9] The asthmatoid wheeze was the only symptom present for seven weeks after aspirating an unidentified seed, and disappeared immediately after bronchoscopic removal of the foreign body.

It has been repeatedly observed that certain vegetable foreign bodies, notably nuts, produce a severe constitutional reaction with a septic laryngotracheobronchitis when aspirated into the air passages of young children. In this connection mention should be made of studies by Taylor [10] on the properties of the sandspur. He believes that, in addition to the irritative mechanical action of the spines there is an increased reaction probably toxichemical due to the formates contained in the

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6. Greene, D. C.: Foreign Bodies in the Larynx, Trachea and Bronchi, Boston M. & S. J. **190**:626 (April) 1924.

7. Negus, V. E.: Endoscopy in Chevalier Jackson's Service, J. Laryngol., Rhinol. & Otol. **39**:145 (March) 1924.

8. Ross, G. T.: Foreign Bodies in the Larynx with Absence of Cough Reflex, Laryngoscope **34**:42 (Jan.) 1924.

9. Clerf, L. H.: Foreign Bodies in the Air and Food Passages. Observations on a Series of Fifty Cases, Laryngoscope **34**:784 (Oct.) 1924.

10. Taylor, H. Marshall.: A Study of the Mechanical and Chemical Properties of the Sandspur from the Standpoint of the Endoscopist and Some Observations on Its Clinical Manifestations in the Larynx, Ann. Otol., Rhinol. & Laryngol. **33**:400 (June) 1924.

younger spines. A similar investigation to determine the etiology of the "peanut reaction" would be most illuminating.

Newman [11] reports three cases of peanut in the bronchus occurring in young children, in whom there was a severe general reaction with marked inspiratory dyspnea. In two of these, no history of foreign body was obtained. They were brought in because of severe dyspnea which required immediate tracheotomy. In all three patients large quantities of pus was found in the trachea. A peanut was removed by bronchoscopy in each case and all children made a complete recovery.

As stated by McCrae,[2] the picture presented by the dyspneic case of arachidic or "peanut" bronchitis is much like that of laryngeal diphtheria. Orton [12] reports an unusual case of bilateral peanut kernel in which a diagnosis of laryngeal diphtheria was made because of dyspnea. Diphtheria antitoxin was given and later the patient was transferred to a hospital for contagious disease. Orton was consulted because of negative throat cultures and the presence of chest signs suggesting a foreign body in the air passages. This was verified bronchoscopically.

Not infrequently it is difficult to rule out nonopaque foreign body, especially in the presence of a strongly presumptive history of foreign body aspiration. Theisen [13] reports the case of a child, aged 4 years, which he saw about one month after the onset of dyspnea with cyanosis. There was a history of probable aspiration of a peanut shell and exposure to diphtheria. Throat cultures were negative, however. Antitoxin was administered. The child eventually died from acute laryngeal edema following the injection of a large dose of antitoxin.

Stiles [14] reports the case of a child, aged 1 year, who, after aspirating a canna seed, had severe paroxysms of coughing with dyspnea and cyanosis. These symptoms were immediately relieved following removal of the seed from the trachea about one-half hour after the accident.

That accurate diagnosis and localization of nonopaque foreign bodies in the air passages by the aid of the roentgen ray can be made, has been conclusively proved by Manges.[15] These bodies being nonopaque, do not cast a distinguishable shadow on the roentgenogram; diagnosis and localization must therefore be made on the observation and interpretation of certain phenomena which are dependent on changes in the

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11. Newman, M. E.: Reporting Three Peanut Cases in Bronchi, Laryngoscope **34**:35 (Jan.) 1924.

12. Orton, H. B.: Bilateral Peanut Kernel in the Bronchi, Laryngoscope **34**:811 (Oct.) 1924.

13. Theisen, Clement F.: Acute Laryngeal Edema, Ann. Otol., Rhinol. & Laryngol. **33**:487 (June) 1924.

14. Stiles, M. P.: Canna Seed in Trachea. Case Report, South. M. J. **17**:703 (Sept.) 1924.

15. Manges, W. F.: Peanut Kernels in the Lungs. Roentgen-ray Diagnosis, of Nonopaque Foreign Bodies in the Air Passages, S. Clin. N. Am. **4**:54 (Feb.) 1924.

mechanics of the air passages. These are brought about by the foreign body plus bronchial obstruction distal to the foreign body and pathologic changes in the immediate vicinity. These changes are best observed during inspiration and expiration. In a majority of these cases of non-opaque foreign body, there is more interference with air passing the obstruction during expiration than inspiration. As a result "obstructive emphysema" is produced on the affected side, with displacement of certain structures. In contradistinction to obstructive emphysema, Manges [16] describes another roentgen-ray sign of foreign body, which is dependent on a decrease in the air content of the portion of the lung distal to a foreign body, namely, atelectasis. In this, there is not only complete interference with the egress of air past the foreign body but no air is permitted to enter during inspiration. Coincident with the absorption of the air contained with collapse of the lung, there is displacement of the mediastinal structures and diaphragm. Although not absolutely diagnostic of foreign body, Manges believes that atelectasis which cannot be explained by some concurrent condition is evidence of bronchial obstruction, and bronchoscopic study at least is indicated.

Among foreign bodies of dental origin, an interesting case of a tooth plate in the bronchus is reported by Waggett and Fyffe.[17] A soldier developed severe dyspnea following dislodgment of his tooth plate. Because of impending asphyxiation he attempted to dislodge the tooth plate by digital manipulation and, managing to push it downward relieved the dyspnea. There was marked edema of the aryepiglottic folds and surrounding tissue. The foreign body was removed from the right bronchus by inferior bronchoscopy. The severe dyspnea occurring at the time of the accident was undoubtedly due to lodgment of the foreign body in the larynx, from which location it was removed by the patient's digital manipulation.

MacGibbon [18] removed a tooth plate by esophagoscopy from the esophagus of an insane patient who behaved well during the operation. The operation was done without anesthesia, general or local. Orton [12] had similar experiences with insane persons in which he did esophagoscopies; in one for a button and in another for a teaspoon in the esophagus.

Gill,[19] in an analysis of 117 cases of foreign bodies of dental origin in the lungs, concludes that care should be taken in every operation about the mouth to prevent aspiration infection; that expectant treatment

16. Manges, W. F.: Atelectasis as a Roentgen-Ray Sign of Foreign Body in the Air Passages, Am. J. Roentgenol. **11**:517 (June) 1924.

17. Waggett, E. B., and Fyffe, E. L.: Tooth-Plate Removed from Right Bronchus by Inferior Bronchoscopy, Brit. M. J. **2**:145 (July 26) 1924.

18. MacGibbon, T. A.: Removal of Tooth Plate from the Esophagus, J. Laryngol., Otol. & Rhinol. **39**:451 (Aug.) 1924.

19. Gill, E. G.: Foreign Bodies of Dental Origin in the Lungs, J. A. M. A. **83**:1738 (Nov. 29) 1924.

of foreign bodies is always hazardous; with a diagnosis of foreign body definitely established, there is but one treatment, namely, bronchoscopy; death is due in most instances to lung abscess, bronchiectasis and gangrene.

Crow [20] reports the case of a child, aged 2 years, who had aspirated a portion of a safety pin. He removed the foreign body by peroral bronchoscopy in four minutes. The child made an uneventful recovery. He emphasized the observation that peroral bronchoscopy is most satisfactory in these cases and should supplant the older method of bronchoscopy through a tracheotomy wound.

Pitkin [21] reports the successful esophagoscopic removal of artificial dentures from the esophagus and the bronchoscopic removal of a tooth from the right main bronchus. He concludes that any object lost during an oral surgical procedure should be considered as having been aspirated until proved otherwise. Diagnosis of foreign body is made by a careful chest examination, by roentgenography and in doubtful cases, by endoscopy. He considers that skilfully performed bronchoscopy and esophagoscopy are safe procedures.

A few of the more important conclusions arrived at by Clerf [9] in an analysis of his series of fifty cases are: The frequency of carelessness as an etiologic factor in foreign body accidents; the occurrence of foreign bodies in the young (in his series, 34 per cent. occurred in children aged 2 years or less); the importance of investigating every case, which gives a history of initial symptoms of laryngeal spasm when holding some object in the mouth; the importance of the asthmatoid wheeze; the need of careful roentgen-ray study in all cases of dysphagia.

MacGibbon [22] reports the case of a child, aged 2 years, with a veil pin in the bronchus, lying across the carina, the point being imbedded in the opposite tracheal wall. He considered cutting the pin but arrived at the same conclusions held by others, namely, the inadvisability and lack of necessity to cut pins.

It has been repeatedly observed by bronchoscopists that certain foreign bodies may remain in the air passages for a long time without producing symptoms, the so-called "symptomless interval." This may or may not be preceded by the initial symptoms of choking, coughing or gagging. When symptoms do occur, their onset is very often insidious and, with the history of foreign body aspiration either forgotten or ignored, a correct diagnosis is often not arrived at. After

20. Crow, D. A.: Removal of Part of a Safety Pin from the Bronchus of a Child by Peroral Bronchoscopy, Brit. M. J. **2**:716 (Oct. 18) 1924.

21. Pitkin, C. E.: Foreign Bodies of Dental Origin in the Air and Food Passages, J. Am. Dental Assoc. (March) 1924.

22. MacGibbon, T. A.: Two Cases of Foreign Bodies in the Lung, J. Laryngol., Otol. & Rhinol. **39**:24 (Jan.) 1924.

observing a case of foreign body in the bronchus, of three years and three months' duration, Garrigues [23] undertook a review of the literature, and studied sixty cases in which the foreign body had remained in the bronchi for more than a year. He was unable to establish a definite symptom-complex, diagnostic of foreign body in the bronchus. He, however, considers the history as being very important and would suspect foreign body in an individual with persistent cough who formerly had no lung symptoms, or in a patient who presented unilateral pulmonary lesions.

In recent cases presenting lung symptoms, a diagnosis of pneumonia is so often made on the physical signs and treatment instituted on that basis. Later it is concluded that the pneumonia is atypical or the diagnosis is changed to empyema, tuberculosis or lung suppuration. A patient who passed through these successive changes in diagnosis is reported by Gittins.[24] A child, aged 5, was first seen by him nine weeks after a severe choking attack while eating peanuts. During this period, the condition was first diagnosed as pneumonia; after ten days it was changed to empyema and rib resection was performed. No pus was found in the pleural cavity. Because of the progressive emaciation and septic appearance of the child, a diagnosis of pulmonary tuberculosis was made, but never confirmed bacteriologically. When seen by Gittins, the physical signs and roentgen-ray findings, combined with the history of foreign body aspiration all suggested a bronchial foreign body. At bronchoscopy a peanut found in the bronchus was removed. The child eventually made a complete recovery.

Simpson [25] reports the case of a boy, aged 11 years, who had a tack in the bronchus for nine years. Although he had frequent colds, symptoms of lung suppuration were present only during the last three years. The author elicited the foreign body history, and had a roentgenogram taken which showed a foreign body. Bronchoscopic removal was done, with complete recovery of the patient.

Occasionally a history of aspiration of a foreign body long forgotten will be recalled when the roentgenogram of the chest reveals the foreign body. Orton [12] reports the bronchoscopic removal of a screw in a child, aged 6 years, who for four and a half years had been treated for pneumonia, empyema, pleurisy, tuberculosis and finally abscess of the lung. Roentgen-ray study of the chest demonstrated a screw in the right bronchus. It was then recalled that the child had aspirated a

23. Garrigues: Tolerated or Unrecognized Foreign Bodies in the Bronchi, Ann. d. mal. de l'oreille, du larynx, etc. **43**:683 (July) 1924.

24. Gittins, T. R.: Peanut in Bronchus Nine Weeks; Case Report; Bronchoscopy; Recovery, Laryngoscope **34**:655 (Aug.) 1924.

25. Simpson, W. L.: A Foreign Body in the Bronchus of Nine Years' Duration, Laryngoscope **34**:877 (Nov.) 1924.

screw when 1½ years of age. He reports another case, a man aged 55, from whose bronchus he removed the vertebra of a squab. There was no history of foreign body aspiration. For three years this man was receiving a pension because it was believed that the laryngeal and pulmonary symptoms resulted from inhalation of acid fumes while working in a platinum refinery.

Although foreign bodies in the bronchus are more often overlooked than esophageal foreign bodies, not infrequently a case of the latter is incorrectly diagnosed. Guisez [26] reports the case of a child, aged 3 years, in whom a diagnosis of Pott's disease had been made. It was found that there was a small iron tube lodged in the esophagus.

Roentgen-ray study of the esophagus without or with radiopaque substance should always be resorted to in cases of foreign bodies in the esophagus. Guisez [27] stresses the importance of the history of the initial accident and the dysphagia. On examining children, very often no history of foreign body is obtainable and the foreign body may be so shaped as to interfere little or not at all with the passage of liquid food. In adults, a history can usually be obtained in nearly all cases and there is practically always dysphagia with solid foods. Guisez believes that esophagoscopy should be done in all doubtful cases.

The complications most commonly met with in foreign body work are due directly to trauma inflicted by the foreign body itself or to ill advised attempts at removal. Careful peroral endoscopy is attended with practically no risks. Occasionally cases are seen in which there is a systemic reaction which in no way can be accounted for by the foreign body. Patterson [28] reports two cases of bronchial foreign body, in which symptoms occurred which were out of all proportion to the pathologic changes produced by the foreign body. In both cases pyelitis, previously suspected, was verified by urinalysis. Following the bronchoscopic removal of the foreign body, the urine cleared and convalescence was uninterrupted.

Sharp pointed foreign bodies are more often seen perforating the esophageal than the bronchial wall. When this occurs, there is usually marked periesophageal inflammation with extensive cellulitis and often with mediastinitis. McGinnis [29] reports the case of a patient, who was seen five days after a small fish bone had lodged in his throat. Esophagoscopy was done which revealed extensive esophagitis with

26. Guisez, J.: Recent Cases of Foreign Bodies in the Esophagus and Respiratory Passages, Bull. d'oto-rhino-laryngol. **22**:89 (May) 1924.

27. Guisez, J.: Latent Foreign Bodies of the Esophagus and Respiratory Tract, Paris méd. **1**:480 (May) 1924.

28. Patterson, Ellen J.: Systemic Complications in Cases of Foreign Body in the Bronchi of Children, Laryngoscope **34**:86 (Feb.) 1924.

29. McGinnis, E.: Mediastinitis as an Occasional Resultant Complication of Foreign Bodies in the Esophagus, Laryngoscope **34**:831 (Oct.) 1924.

perforation of the esophageal wall. No foreign body could be found. The patient eventually succumbed. Necropsy showed suppurative periesophagitis with extensive suppurative changes involving all the mediastinal structures.

Imperatori [30] reports a very interesting case of tooth in the bronchus, complicated by emphysema of the mediastinum and bronchopneumonia. At necropsy, a perforation distal to the tooth was found, which explained the emphysema.

Nearly every endoscopist has seen patients in whom there has been extensive trauma, inflicted either by attempts at digital removal or due to improper instrumentation. Digital manipulation is usually attempted by the patient or by a solicitous relative or friend. One still hears of attempts to push a foreign body into the stomach with the aid of a tube or bougie, or, what is worse, using obsolete instruments such as the coin catcher and bristle-probang. An example of this is shown in the case reported by Orton,[12] of a man who had a large bolus of food lodged in the esophagus. Ineffective attempts at removal were made by three physicians. There was emphysema of the neck with edema of the larynx and multiple lacerations of the esophagus so that esophagoscopic removal of the foreign body by Orton was rendered difficult. Another case, a child with a nickel in the esophagus, was reported by McGinnis [29] where a physician had worked for two hours without finding the foreign body. Although esophagoscopic removal of the coin was done by McGinnis without difficulty and without inflicting additional trauma, the child died of acute suppurative esophagitis and mediastinitis.

Iglauer and Ransohoff [31] reported a case of foreign body perforating the esophagus in which unusual roentgen-ray signs were observed, namely, thickening of the retropharyngeal tissues, with beginning abscess formation and the appearance of air bubbles in this area.

Cases of foreign body complicated by acute exanthems present not only additional difficulties in diagnosis but also bring up the question of determining whether or not bronchoscopy or esophagoscopy should be done. Patterson [32] reports three cases of foreign body which presented these problems. A child, aged 2½ years, had a coin removed by esophagoscopy. The next day a measle rash appeared. Recovery was uneventful. A second patient, with a paper fastener in the

30. Imperatori, C. J.: Further's Report of Accidental Oxygen Emphysema in a Child Following Attempts at Removal of Upholsterer's Tack, Laryngoscope **34**:107 (Feb.) 1924.

31. Iglauer, S., and Ransohoff, J. L.: Perforation of the Esophagus by a Foreign Body with Report of a Case Presenting Unusual Roentgen-Ray Signs, Laryngoscope **34**:821 (Oct.) 1924.

32. Patterson, Ellen J.: Foreign Bodies in the Respiratory Tract and Esophagus, Atlantic M. J. **27**:797 (Sept.) 1924.

bronchus, had been unsuccessfully bronchoscoped before admission. While delaying bronchoscopy to permit the child to recuperate from the previous operation, it developed chickenpox. Bronchoscopic removal of the foreign body, considered advisable at this time, was successfully done and the patient made a complete recovery. A third case, a child, aged 18 months, had aspirated a Syrian bean. Severe dyspnea resulted, which was not relieved after bronchoscopic removal of the foreign body and tracheotomy was done. Three days later the child developed chickenpox. Complete recovery ensued.

An important contribution to the literature on foreign bodies is a statistical review by Jackson,[33] of foreign body cases, from number 631 to number 1,155, at the Bronchoscopic Clinic. The author was awarded the Research Fund Prize by the American Laryngological, Rhinological and Otological Society. The review was evidently arranged with the object of being of maximum use to those consulting the literature in reference to the removal of foreign bodies. The cuts of the foreign bodies are shown, actual size. The age of the patient, the size of the tube, and the instruments used, the particular difficulties encountered, the mechanical problem presented and its solution are all shown in tabular form. The duration of the operation is given as an index to the difficulties encountered, and the efficiency or inefficiency of the method used in that particular mechanical problem.

COMMENT

It is evident from the foregoing review that the foreign body problem is being considered as a distinct entity in medicine. Recognition of this condition is no longer a matter of chance. The methods of removal have a scientific basis and are problems for those properly qualified and equipped. These thoughts are well expressed by Patterson[34] in a historical review of the foreign body problem dating back to the sixth century. She concludes that the foreign body problem has practically been the same since the beginning of time, namely, how safely to rid the patient of the intruder.

LUNG SUPPURATION

Pulmonary Abscess Secondary to Tonsillectomy.—The subject of post-tonsillectomic lung suppuration is very rapidly developing into one of the most important considerations of the tonsil operation. It seems to be taken for granted that the aspiration route of infection is the

33. Jackson, Chevalier: Foreign Bodies in the Air and Food Passages. Charted Experience in 1,155 Cases of the Bronchoscopic Clinic, Ann. Otol., Rhinol. & Laryngol. **33**:1009 (Dec.) 1924.

34. Patterson, E. J.: Foreign Bodies in the Air Passages and Esophagus. Review of Cases in History and Literature, Laryngoscope **34**:785 (Oct.) 1924.

more common, and that the hematogenous and lymphogenous routes are responsible for a certain percentage of cases. What these percentages are it is impossible to determine. In a carefully prepared contribution, Fetterolf and Fox [35] have shown experimentally that the blood stream as a route of pulmonary infection cannot be ignored. They have found that the lower lobes of the lungs are the ones most commonly involved in infections of blood stream origin.

The adherents of the aspiration theory have endeavored to preserve the laryngeal reflex and cough by light anesthesia during tonsillectomy, in order to minimize the danger of aspiration of infected material. Myerson,[36] in a bronchoscopic study of these reflexes in a series of 100 cases of tonsillectomy under light anesthesia, found that seventy-six of these patients had blood in the tracheobronchial tree. He concludes that the laryngeal reflex does not insure cough except in the presence of an increased stimulus. He does not believe that the pharyngeal content of blood, mucus and saliva is a sufficient stimulus to provoke the cough reflex under these conditions.

In lung suppuration, bronchoscopy is recognized as a useful aid in the diagnosis and localization of the diseased focus and a valuable adjunct in its treatment. Viewed purely from the standpoint of the internist, Funk,[37] after observing a large number of cases of lung suppuration treated bronchoscopically, believes that bronchoscopy has a definite place as an aid in the treatment of lung suppuration. He emphasizes the need of considering bronchoscopy as an adjunct that does not replace those measures which have been found useful in the past. Although it does not prove useful in every case he believes that, if skilfully done, it should be given a trial because of the safety of the procedure, the minimum of discomfort experienced by the patient and the spectacular results obtained in some cases.

Lukens and Moore,[38] after presenting a series of cases of lung suppuration treated bronchoscopically, conclude that bronchoscopy is the logical means to improve drainage of the suppurating focus. Bronchoscopy is unattended with any risk if performed by a properly trained group. All patients cannot be cured by bronchoscopic treatment; however, a certain percentage certainly can be cured and a larger percentage can be improved.

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35. Fetterolf, G., and Fox, H.: Reaction of Peritonsillar Tissue to Tonsillectomy, Am. J. M. Sc. **166**:802 (Dec.) 1923.

36. Myerson, M. C.: Bronchoscopic Observations on the Cough Reflex in Tonsillectomy Under General Anesthesia, Laryngoscope **34**:63 (Jan.) 1924.

37. Funk, E. H.: The Relation of Bronchoscopy to Treatment of Lung Suppuration, S. Clin. N. Am. **4**:27 (Feb.) 1924.

38. Lukens, R. M., and Moore, W. F.: Bronchoscopic Treatment of Pulmonary Suppuration and Bronchial Asthma, Ann. Otol., Rhinol. & Laryngol. **33**:956 (Sept.) 1924.

A broad general review by Jackson,[39] of the subject of bronchoscopy as an aid to treatment, leads him to conclude that bronchoscopy for diagnosis is of great assistance in obscure cases and has often aided in the revision of previous clinical diagnoses. In all nontuberculous, nonmalignant, not hopeless cases of lung suppuration, peroral bronchoscopic drainage is worthy of first consideration. In certain recent cases, the aspiration incident to a diagnostic bronchoscopy has been followed by remarkable improvement of the patient. Bronchoscopy, either for diagnosis or treatment, should be carried out only under the guidance and observation of the internist. Bronchoscopic drainage has often turned the tide in the patient's favor in those cases in which the internist has enabled the patient to hold his own, but without progress toward cure. Drainage is improved by the bronchoscopic removal of obstructing granulations, by dilatation of stenosed bronchi and by restoration of ciliary action through aspiration of areas of purulent drowned lung.

Moore [40] reports thirty-eight cases of lung suppuration which were treated bronchoscopically. The observations made at bronchoscopy are noted and the treatment employed is detailed. Of the first thirteen cases treated, 25 per cent. were cured, 41.6 per cent. were improved and 33.3 per cent. were unimproved.

Lukens [41] records a case of lung abscess following tonsillectomy which was cured by bronchoscopic drainage. He stresses the importance of anaerobic studies of the pus removed for bacteriologic examination and for vaccine. If studies are made only by aerobic methods, the specimen will often be reported as sterile.

The bronchoscopist is often called on by the surgeon and the internist to aid in the differentiation between bronchitis, bronchiectasis and abscess or to determine the presence of a fistulous communication. Aside from the information gained by diagnostic bronchoscopy, the Jackson method of lung mapping described by Clerf [42] offers a practical means of accurate localization. This is accomplished by bronchoscopic insufflation of bismuth subcarbonate into the bronchus or bronchi to be examined and taking of stereoscopic ray plates immediately afterward. He believes that if properly carried out, it is practically free from danger, being less harmful even than needling.

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39. Jackson, Chevalier: Suppurative Diseases of the Lung; Bronchoscopic Drainage as an Aid to Treatment by the Internist, Tr. Acad. Ophthal. & Otolaryn., 1923.

40. Moore, W. F.: Bronchoscopic Treatment of Suppurative Diseases of the Lungs, J. A. M. A. **82**:1036 (March 29) 1924.

41. Lukens, R. M.: Pulmonary Abscess Following Tonsillectomy, S. Clin. N. Am. **4**:70 (Feb.) 1924.

42. Clerf, L. H.: Bronchoscopic Lung Mapping in Diseases of the Lungs, S. Clin. N. Am. **4**:104 (Feb.) 1924.

Additional radiopaque substances are being used in pneumonography. Important among these is an iodized fat, containing 40 per cent. of iodin by weight. The technic of its use is reported by Armand-Delille and Moncrieff.[43] It is injected into the trachea through a cannula previously introduced through the cricothyroid membrane with the aid of a trocar. About 10 cm. of lipiodal are required to inject the bronchi of a child, aged from 7 to 14 years.

In the surgical treatment of lung suppuration, the bronchoscopist can often aid the surgeon by bronchoscopic sounding. This method was resorted to by Shallow and Clerf [44] in a case of bronchiectasis with multiple abscess cavities. After thoracotomy had been done, the bronchoscope was passed by sight through the mouth and into the largest abscess cavity. The surgeon was able to palpate the distal end of the bronchoscope and use it as a guide on which to cut down with the cautery.

Bronchoscopy in Asthma.—Bronchoscopic studies are being carried out by Lukens and Moore,[38] who believe that too little time has elapsed to permit of definite conclusions. They have repeatedly observed improvement following bronchoscopy in patients with thick tenacious secretion adherent to the bronchial walls. Jackson [39] finds that the greatest benefit is seen in patients with chronic bronchitis; in those unassociated with chronic bronchitis no benefit has been obtained from bronchoscopy.

BRONCHOSCOPY IN DISEASE

Prior to the advent of bronchoscopy, the diagnosis of many endotracheal and endobronchial conditions was made by the pathologist at the necropsy table. With the increasing number of physicians qualified to carry out bronchoscopic procedures, there has been a proportionate increase in the number of reported cases of tracheobronchial disease in the living.

Greene [45] reports the history of a young woman, aged 19, complaining of obscure chest symptoms. He did a diagnostic bronchoscopy and found a tumor mass occluding the left main bronchus. A portion was removed for pathologic study and was reported to be malignant, probably carcinoma.

Orton [46] reports the case of a man, aged 29, who had a productive cough over a period of two years. A diagnostic bronchoscopy was done,

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43. Armand-Delille, P. F., and Moncrieff, A.: The Use of Lipiodol in the Diagnosis of Bronchiectasis, Brit. M. J. **2**:7 (July) 1924.

44. Shallow, T. A., and Clerf, L. H.: Surgical Treatment of Bronchiectatic Cavities, Proc. Philadelphia Acad. Surg., 1924.

45. Greene, D. C.: Report of Case of Carcinoma in Left Primary Bronchus, Laryngoscope **34**:93 (Feb.) 1924.

46. Orton, H. B.: Carcinoma of Bronchus, Laryngoscope **34**:97 (Feb.) 1924.

which revealed a polypoid whitish yellow growth in the right bronchus. The specimen was removed and examined microscopically. James Ewing diagnosed the tissue as carcinoma, originally of papillary type.

Cavenagh [47] cites an interesting case of a youth, aged 17, who presented physical signs over the right side of the chest suggesting a foreign body, although new growth and enlarged bronchial glands were considered. The bronchoscopic diagnosis was new growth which was verified by necropsy.

Syme [48] made a diagnosis of new growth of the trachea by direct examination in the case of a woman, aged 38, who complained of dyspnea and general ill health. Pathologic examination showed the condition to be a columnar cell carcinoma.

Diagnostic bronchoscopy by Hajek [49] in a woman, aged 56, complaining of a chronic productive cough, enabled him to make a diagnosis of pneumolithiasis. Removal of the pneumoliths with obstructing granulations was followed by complete cure.

Jackson [39] reports a case of broncholithiasis with bronchiectasis, in which a broncholith was removed by peroral bronchoscopy.

An unusual case of urticaria of the trachea was observed by Freudenthal,[50] which occurred in a woman aged 40. Although there was a mass of granulation-like tissue in the pharynx which was being treated, no relief was afforded the patient until an orthoform-menthol emulsion was injected into the trachea. Tracheoscopy was done, which revealed an urticarial wheal on the posterior tracheal wall.

Bronchoscopic study in certain obscure forms of tracheobronchitis will undoubtedly give additional important information and may ultimately contribute toward establishing the etiology. Baum [51] reports obscure conditions in four patients, who developed severe laryngitis with dyspnea, necessitating tracheotomy. All showed marked inflammation of the larynx, trachea and bronchi. Three died from bronchial obstruction; the fourth patient, with popcorn in the bronchus, recovered. The bronchial obstruction which could be demonstrated by physical signs was produced by a peculiarly thick, sticky secretion, which, scanty in amount, tended to dry, forming hard masses in the tracheotomy cannula

47. Cavenagh, J. B.: Case of Lymphosarcoma of Mediastinum Suggesting Foreign Body in Bronchus, J. Laryngol. & Otol. **39**:702 (Dec.) 1924.

48. Syme, W. S.: Some Affections of the Trachea, J. Laryngol. & Otol. **39**:305 (June) 1924.

49. Hajek, M.: Unilateral Purulent Bronchitis Due to Pneumoliths. Removal of the Cause; Cure, Ztschr. f. Hals-, Nasen- u. Ohrenh. **8**:206 (May) 1924.

50. Freudenthal, W.: A Case of Urticaria of the Trachea, Laryngoscope **34**:116 (Feb.) 1924.

51. Baum, H. L.: Some Endoscopic Observations on Laryngotracheitis, Ann. Otol., Rhinol. & Laryngol. **33**:782 (Sept.) 1924.

and in the bronchi. There was an absence of cough. The plugs in the bronchi were successfully removed bronchoscopically, with complete temporary relief of symptoms and obstruction so long as they occurred in the larger bronchi, but when occurring in the smaller bronchi they could not be reached.

Lynch [52] was able bronchoscopically to demonstrate a membraneous exudate in the trachea and bronchi of several cases of exudative tracheobronchitis caused by the staphylococcus albus.

The value of bronchoscopy as an aid in the postoperative care of laryngectomized patients was clearly demonstrated by Lewis [53] who, in a series of thirteen laryngectomies for cancer, reported two patients who, several days after operation developed alarming symptoms of air hunger, with cyanosis. The tracheotomy tubes were found clear. Bronchoscopy was then done and large masses of inspissated blood and secretion were found at the carina blocking the bronchi. It was necessary to repeated the bronchoscopy eight times in each case because of the symptoms of dyspnea.

That the bronchoscope and aspirating tube are in great part responsible for the low postoperative mortality rate (not over 1 per cent.) of tracheotomy in the Bronchoscopic Clinic is the opinion of Clerf,[54] who reports an unusual case of a child, aged 2 years, with a peanut in the bronchus. Following bronchoscopic removal of the foreign body, dyspnea increased and tracheotomy was done. About thirty-six hours later dyspnea with restlessness again developed. Chest examination showed signs of bronchial obstruction. The tracheotomy tube was changed without relief. There was no cough nor could the cough reflex be provoked. Bronchoscopy was done and small masses of secretion were removed with forceps and aspirating tube. The symptoms were relieved but soon recurred, necessitating another bronchoscopy. In all, seventeen bronchoscopies were done within 104 hours. With return of the cough reflex, aspiration of the trachea gave relief and later this became unnecessary. Decannulation was done in three weeks and the child was discharged well. The author concludes that postoperative lobar pneumonia is an uncommon complication in tracheotomy. Too often the supposed pneumonia is a mechanical obstruction to the airway, caused by secretion which can be removed by bronchoscopy or with the aspirating tube.

The dog has been a most useful animal in the development of peroral endoscopy. It is gratifying to note that the time has arrived when dogs

52. Lynch, R. C.: Potpourri, Laryngoscope **34**:753 (Oct.) 1924.

53. Lewis, F. O.: Bronchoscopy the Life-Saver in Two Unusual Cases, Laryngoscope **34**:100 (Feb.) 1924.

54. Clerf, L. H.: Seventeen Life-Saving Bronchoscopies in One Case, Surg., Gynec. & Obst. **38**:422 (April) 1924.

may receive the benefits of bronchoscopy and esophagoscopy as patients. Horning and McKee [55] report investigations in this field that far exceeded their earlier expectations and will probably demonstrate the great importance of these measures in the diagnosis and treatment in diseases of dogs, cats and possibly other animals. The work has been done on the smaller dogs, using Jackson's child's bronchoscope. Although foreign bodies in the air passages of dogs are uncommon, these investigators report the bronchoscopic removal of a spicule of bone from the right bronchus of an Airedale, in which the asthmatoid wheeze was observed.

In connection with this work, observations made on disease in the lower animals have often furnished data valuable in human cases. Horning [56] reports observations on a form of gastro-intestinal influenza in cats. Gastric lavage, the form of treatment found most effective, is best carried out with the esophagoscope.

After briefly recounting his experiences at the Bronchoscopic Clinic, Martin [56a] reviews foreign body cases from the standpoint of frequency of occurrence, of symptoms and of diagnosis. He also stresses the importance of bronchoscopy in the treatment of pulmonary conditions other than foreign bodies, and gives a brief summary of the records of two patients with lung suppuration who were greatly benefited by bronchoscopy. He states that a general anesthetic is not required either for esophagoscopy or for bronchoscopy, and that in young children even cocain is unnecessary. Concluding, he believes that bronchoscopy should be performed on patients with bronchiectasis to exclude the possibility of a foreign body, and that local treatment can be carried out through the bronchoscope.

By bronchoscopy, Chevalier Jackson [56b] was able to make a diagnosis of pseudomembranous bronchitis accompanied by mucosal ulceration in two patients. Bacteriologic examination of the bronchoscopically removed pus and whitish exudate showed large numbers of Vincent's bacilli and spirilla. In one patient, complete recovery followed six bronchoscopies; the other patient did not return for treatment.

ESOPHAGOSCOPY IN DIAGNOSIS AND TREATMENT

Diagnoses made by inference, or by using methods which give inconclusive information and are in themselves a source of danger to the

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55. Horning, J. G., and McKee, A. J.: Bronchoscopy and Esophagoscopy in Dogs and Cats, Veterinary Med. **19**:649 (Dec.) 1924.

56. Horning, J. G.: Influenza in Cats, Veterinary Med. **19**:671 (Dec.) 1924.

56 a. Martin, G. E.: Application of the Bronchoscope in the Diagnosis and Treatment of Certain Affections of the Chest, Edinburgh M. J. **31**: (June) 1924.

56 b. Jackson, Chevalier: Ulcerative Bronchitis Due to Vincent's Organisms, J. A. M. A. **83**:1845 (Dec. 6) 1924.

patient, might be permissible if these were the commonly accepted and only available sources of information. In present day diagnosis of esophageal disease, the chief reliance is placed on direct inspection of the interior of the esophagus in conjunction with biopsy and roentgen-ray studies. This fact was particularly emphasized by Orton [57] who, after reviewing the literature on sarcoma of the esophagus and citing a personal case concludes that: "diagnosis can be confirmed only by esophagoscopy and histological examination." He further states that the clinical symptoms are variable and therefore are unreliable for assuring a positive diagnosis unless esophagoscopy is done and a specimen of tissue is removed. He finds that sarcoma is more common in men, occurring late in life and commonly involves the thoracic esophagus. Progressive dysphagia with an accompanying weight loss is a constant finding.

Vernieu,[58] by esophagoscopy, was able to verify a roentgen-ray diagnosis of multiple diverticula of the hypopharynx and, in addition, demonstrated the presence of apparently leukoplakic spots about the lowermost sacs.

In reviewing the subject of cancer of the esophagus, Carmody [59] believes that the diagnosis should be corroborated by roentgen ray, esophagoscopy and biopsy in the order named. In the use of radium for endo-esophageal treatment, he believes that its placing under direct vision is undoubtedly the best method.

STRICTURE OF ESOPHAGUS

Cases of stricture of the esophagus are of great interest to the peroral endoscopist because of the part that esophagoscopy takes in the diagnosis and treatment. McKinney [60] reports the case of a child, aged 13 months, who developed marked dysphagia with regurgitation and weight loss following a fall seven weeks previously. Esophagoscopy was done which revealed no abnormality. Following this, swallowing became normal and there was a rapid increase in weight until about one month later when the dysphagia again recurred. Esophagoscopy was done and the child has been perfectly normal since.

The treatment of cicatricial stenosis of the esophagus, always a difficult problem to the esophagoscopist, has been solved in a very prac-

57. Orton, H. B.: Sarcoma of the Esophagus, Ann. Otol., Rhinol. & Laryngol. **33**:1236 (Dec.) 1924.

58. Vernieu, W. E.: Multiple Diverticulae of the Hypopharynx and Esophagus, Bull. d'oto-rhino-laryngol. **22**:20 (Jan.) 1924.

59. Carmody, T. E.: Treatment of Carcinoma of the Esophagus with Radium, Laryngoscope **34**:102 (Feb.) 1924.

60. McKinney, R.: Spasmodic Stricture of the Esophagus in a Thirteen Months Old Baby, Laryngoscope **34**:840 (Oct.) 1924.

tical manner by Tucker.[61] After considering the etiology, pathology and symptoms of cicatricial stenosis and reviewing the various methods of treatment that have been devised, he presents a method of retrograde bouginage using a bougie devised by himself. The technic is discussed in detail. It can be carried out only in patients previously gastrostomized. The author reports twenty-five cases of stricture of the esophagus, in which the patients have been successfully treated by this method. He concludes that blind bouginage or rapid instrumental dilatation in the treatment of cicatricial stenosis of the esophagus are dangerous. Esophagoscopic bouginage, relatively safe in careful hands, is a slow method especially in multiple eccentric strictures. He believes that retrograde dilatation, using his specially devised bougie, constitutes a method of treatment which is simple in its performance, affords a maximum of safety and gives curative results more quickly than any other justifiable method.

Lynch [52] reports excellent results in cases of tight strictures of the esophagus by passing a small rubber tube over a wire through the stricture. The rubber tube tends to soften the stricture and also can be used as a feeding tube.

Guisez [62] reports a series of eighteen cases of nonmalignant stenoses of the esophagus which required gastrostomy. In all of these, he was able to reestablish the esophageal lumen with the aid of endoscopy. In addition, he treated sixteen other cases of cicatricial stenosis with complete dysphagia, and forty cases of inflammatory stenosis with almost complete closure of the esophagus. In all cases he was able by endoscopic means to pass a filiform bougie through the narrowed opening, and then successively dilated each stricture under direct vision. He believes that electrolysis renders the cicatricial tissue more flexible and not only aids but also tends to maintain dilatation.

A subject of great interest is the restoration of the esophageal lumen in cases of atresia of the esophagus. Clerf [63] reports the case of a boy, aged 10 years, who accidentally swallowed a solution of lye and in whom the esophagus was atresic so that not even saliva could be swallowed. He was able to pass a Jackson filiform esophagoscopic bougie through the stenosed lumen by retrograde esophagoscopy. The upper extremity of the bougie was recovered through the mouth, and a silk thread

61. Tucker, G.: Cicatricial Stenosis of the Esophagus with Particular Reference to Treatment by the Continuous String. Retrograde Bouginage with Author's Bougie, Ann. Otol., Rhinol. & Laryngol. **33**:1180 (Dec.) 1924.

62. Guisez, J.: Some Forms of Serious Stenosis of the Esophagus Having Necessitated Gastrostomy Cured by Esophagoscopy, Bull. d'oto-rhino-laryngol. **22**:189 (Sept.) 1924.

63. Clerf, L. H.: Atresia of the Esophagus, S. Clin. N. Am. **4**:111 (Feb.) 1924.

attached to it was then withdrawn through the gastrostomy fistula. Retrograde bouginage, using the Tucker bougie, was done and the patient eventually was cured.

The restoration of the lumen of an impermeable stricture of the esophagus was reported by King,[64] in the case of a young woman on whom gastrostomy had previously been performed to maintain nutrition. By peroral and retrograde esophagoscopy the stenosed area was definitely localized. A forceps passed through the perorally placed esophagoscope then perforated the stenosed area under fluoroscopic guidance. It was possible through the retrograde esophagoscope to observe the forceps emerging from the stenosed into the substrictural esophagus. A string was carried through for subsequent bouginage. The patient made a perfect recovery.

GASTROSTOMY

Gastrostomy while not strictly an endoscopic subject has an important bearing on diseases of the esophagus and on endoscopic retrograde methods. Jackson[65] advises early gastrostomy in extensive ulceration or stenosis of the esophagus resulting from the ingestion of caustic alkalis or other irritants. Gastrostomy permits proper feeding of the patient, it puts the esophagus at rest and stops the static esophagitis and ulceration, which invariably tend to increase the amount of cicatricial tissue already present and, further, it provides the means of carrying out a safe and rapid method of treatment with the Tucker[61] retrograde bougie.

A very important article by Shallow[66] describes an improved technic developed by him at the Jefferson Hospital. He reports a series of eighty cases, in which the operative mortality rate and complications were much reduced. The fistula is the most favorable in form, angle and position for carrying out retrograde esophagoscopy, gastroscopy, pyloroscopy and duodenoscopy.

PYLOROSCOPY

According to Jackson,[67] peroral pyloroscopy is a practicable procedure in all infants and younger children. At the Bronchoscopic Clinic, the Jackson open tube gastroscope is used in preference to a tube with a lens system. In some cases the inflating gastroscope can be used to good advantage. The author reports the case of an infant, aged

64. King, E.: A New Method of Restoring the Lumen in a Case of Impermeable Stricture of the Esophagus, Surg., Gynec. & Obst. **39**:596 (Nov.) 1924.

65. Jackson, Chevalier: Chalk Talk on Gastrostomy, S. Clin. N. Am. **4**:8 (Feb.) 1924.

66. Shallow, T. A.: Gastrostomy, S. Clin. N. Am. **4**:114 (Feb.) 1924.

67. Jackson, Chevalier: Pyloroscopy, S. Clin. N. Am. **4**:2 (Feb.) 1924.

11 months, in whom a peroral pyloroscopy was done for removal of an open safety pin. The pin had become wedged in the pylorus, the keeper being in the duodenum with the point branch still in the stomach. Pyloroscopy was done without anesthesia, general or local, under fluoroscopic guidance using the double plane fluoroscope. The safety pin was successfully removed in twenty-four minutes and fifty-three seconds. The child had no reaction and has been well since.

RETROGRADE ESOPHAGOSCOPY, GASTROSCOPY AND DUODENOSCOPY

Retrograde methods are procedures of great usefulness in diagnosis and treatment. In an important contribution by Tucker,[68] the preliminary preparation necessary for these procedures is detailed.

Retrograde esophagoscopy seems simple in theory, but Tucker[68] believes that it is not so easy as might be supposed. The greatest difficulty is experienced in finding the abdominal esophagus. The spine serves as the best anatomic guide. In a patient able to swallow liquids, this procedure can be simplified greatly by having him swallow two yards of silk thread. The lower end is removed through the gastrostomy fistula and, threaded through the esophagoscope, serves as a string guide which will lead to the hiatus.

Lewis[69] has found retrograde esophagoscopy very useful in determining the lowermost limits of cancerous growths of the esophagus. This was done in conjunction with peroral esophagoscopy, so that the extent of a growth could be determined before instituting radium treatment.

King[64] and Clerf[63] have found retrograde esophagoscopy indispensable in the treatment of complete cicatricial stenosis of the esophagus.

Retrograde gastroscopy permits of exploration of all parts of the stomach. According to Tucker,[68] this method of examination has a large field of usefulness in that group of cases in which gastroenterostomy is done. In addition, direct application can be made to any ulcerated areas, or if necessary a specimen can be taken.

Retrograde duodenoscopy can be more readily carried out if the gastrostomy fistula is placed as near the median line as possible. Although the first portion of the duodenum is the only part accessible for exploration, one must recall that over 90 per cent. of duodenal disease occurs in this portion. It therefore follows that this method of direct examination, feasible in all cases properly gastrostomized, can be of great assistance to the surgeon.

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68. Tucker, G.: Retrograde Esophagoscopy, Gastroscopy and Duodenoscopy, S. Clin. N. Am. **4**:77 (Feb.) 1924.

69. Lewis, F. O.: Preliminary Report of Retrograde Esophagoscopy in Cancer of the Esophagus, Laryngoscope **34**:99 (Feb.) 1924.

News and Comment

COMING MEETINGS

National Society Meetings

The American Otological Society will hold its annual meeting at Hotel Raleigh, Washington, D. C., Monday and Tuesday, May 4 and 5, 1925. Dr. Eugene A. Crockett, Boston, President; Dr. T. J. Harris, 104 East 40th St., New York, Secretary.

The American Laryngological, Rhinological and Otological Society will hold its annual meeting at Atlantic City, N. J., on May 22 to 25, 1925, inclusive. Dr. W. H. Haskin, New York, President; Dr. R. L. Loughran, 145 West 58th St., New York, Secretary.

Local Society Meetings

PHILADELPHIA: Section on Otology and Laryngology of the College of Physicians of Philadelphia, meets third Wednesday of the month from October to June, at 8:30 p. m., at the College of Physicians. Chairman, Dr. Fielding O. Lewis; Secretary, Dr. James A. Babbitt, 2117 Chestnut Street.

CLEVELAND: Ophthalmological and Otolaryngological Section of Cleveland Academy of Medicine, meets fourth Friday of each month at the Winton Hotel. Chairman, Dr. E. W. Garrett; Secretary, Dr. M. Paul Motto, Rose Building.

CHICAGO: Chicago Laryngological and Otological Society, meets first Monday of the month from October to May at the Crystal Room, Great Northern Hotel. Chairman, Dr. E. H. Norcross; Secretary, Dr. A. A. Hayden, 25 East Washington Street.

Abstracts from Current Literature

Ear

CAUSES AND TREATMENT OF OTITIS MEDIA. DAVID T. SMITH, Am. J. Dis. Child. **28**:1 (July) 1924.

Smith made an exhaustive study of all patients admitted to the Harriet Lane Home for Invalid Children, Johns Hopkins Hospital, from Feb. 6 to Aug. 6, 1923, including a careful examination of the ears. The records were completed in 613 and of these, 205 patients (33.4 per cent.) either had otitis media at the time of admission or contracted it while in the hospital. Nearly one-fourth of the patients (22.5 per cent.) entered with this disease. Race and sex apparently had no influence on the incidence of the disease, but Smith's studies show that there is a distinct seasonal variation, which corresponds roughly to that of the acute respiratory infection, there being a gradual decline of incidence from 47.3 per cent. in February to 23.6 per cent. in July.

The most important single factor in the susceptibility to otitis media is the age of the patient, the period between the ages of 3 and 15 months representing the most susceptible age. More than 50 per cent. of the children in this group developed infection. The disease did not, however, run a more prolonged course in these children than in those of other ages.

The incidence of otitis media is influenced by the nature of the disease which it complicates. Pneumonia, dysentery, nasal diphtheria, pertussis and pyelitis showed complicating otitis in 50 per cent. or more of the cases, while premature infants and the miscellaneous noninfectious conditions show 20 per cent. or less. Patients under 3 years of age with pneumonia showed an incidence of otitis which follows the seasonal curve of the average but with a 20 per cent. higher level. The associated pneumonia seems to have but little influence on the percentage after the fourth year. The other acute infections showed the same type of curve as pneumonia but with values very much closer to the average, and the miscellaneous cases are represented by a line which parallels the average but at a 15 per cent. lower level.

Cultural studies made from the aural discharge, taken either directly after paracentesis, or at intervals varying from one to three weeks after the appearance of the discharge, showed hemolytic streptococci in pure culture in over 50 per cent. of the cases and in mixed culture in 6 per cent. Streptococci and staphylococci were the most frequent micro-organisms and pneumococci were infrequently found.

The average time of discharge was twenty-five days, and the treatment which had been followed previous to these studies had been paracentesis, followed by irrigation with bichlorid of mercury.

The author mentions the possibility that otitis media may, in some way, be associated with vitamin deficiency, and calls attention to the fact that most of the patients had been on artificial feedings and had received little or no cod liver oil before admission. The age period of greatest susceptibility corresponds rather closely to that shown for rickets and scurvy.

The author concludes, from the fact that pure growths of streptococci were isolated from early cultures, the high incidence of the disease in hospitals for children and the occurrence of several cases in succession in isolated family groups, that the disease may become definitely contagious.

In view of the somewhat unsatisfactory results obtained by the routine use of bichlorid of mercury irrigations, the author decided to try various synthetic drugs and dyes. Paracentesis was first performed whenever needed and the external auditory canal was cleansed with half strength hydrogen

peroxid, using a small medicine dropper fitted with a stout rubber bulb. There was no case of mastoiditis following the use of hydrogen peroxid, and the author feels that there is no danger of such complication from the use of the solution.

One of the first drugs tried was sodium hydroxy-mercuri-benzophenone sulphonate. This drug was efficient in cleaning up the discharge in cases which showed colon bacilli, influenced favorably those showing streptococci, while those showing staphylococci, gram-negative diphtheroids, diphtheria bacilli and pyocyaneus were not influenced. The drug deteriorates rapidly on standing.

Gentian violet was also tried and with excellent results when the organism involved was staphylococcus, diphtheroid or pneumococcus. Patients with conditions caused by streptococcus were somewhat improved, while those associated with pyocyaneus were not helped. It had, of course, no action on the gram-negative organisms of the colon group. The principal objection to the use of gentian violet is its staining properties.

A 2 per cent. solution of acetic acid was tried in combination with the sodium solution, in an effort to find a drug that would control pyocyaneus infection. This combination was just as efficient in killing bacteria of the colon group as the sodium solution alone, and it killed pyocyaneous in higher dilutions than acetic acid. The mixture is nonirritating.

Neutral acriflavine was found to kill streptococci in considerably higher dilutions than did gentian violet, and a mixture of neutral acriflavine and gentian violet was more effective with pyocyaneus than any other drug alone and more bactericidal for streptococci than gentian violet. Neither neutral acriflavine nor gentian violet acriflavine mixture gave entirely satisfactory results in cases of otitis associated with streptococci.

Twenty patients with chronic otitis media were treated by paracentesis, cleansing with hydrogen peroxid, and alternate treatments with the solutions of 0.5 per cent. sodium and 2 per cent. gentian violet. The results of this treatment were good, twenty out of twenty-one patients being cured, and the disease recurring in only two of the series.

The results of this treatment in the cases of acute otitis media were much better than those obtained with bichlorid of mercury irrigations, but were not so striking as those obtained in the chronic group. The average time of discharge for sixty patients acutely ill was thirteen days, as compared with an average of twenty-five and a half days for the controls. Streptococci were found in more than half of the acute cases, and neither gentian violet nor neutral acriflavine were very effective in the treatment of otitis associated with these organisms. The symptoms lasted for an average of twenty-one days each, which is only slightly better than the average of the controls, which was twenty-one and a half days. In many of these cases, however, the clinical improvement was striking.

CONNOR, St. Paul.

CONSERVATIVE TREATMENT OF THE CHRONIC SUPPURATIVE EAR. WILLIAM HENRY HASKIN, Ann. Otol., Rhinol. & Laryngol. **33**:1272, 1924.

The three principal factors underlying the treatment of chronic suppurative ear disease are outlined by the author as follows: first, the danger of serious complications; second, the preservation of hearing; and third, the curing of the discharge. A careful and thorough study is urged in each case, and if satisfactory results are to be expected, the physician must keep close watch of the condition and not trust the treatment to the patient or the parents for any prolonged period. Briefly, the method of treatment used so successfully by Haskin is to remove all secretions with suction, remove any dry masses with small instruments and alligator forceps, careful sterilization with 75 per cent. alcohol, dry with a current of air at low pressure and not too long application to produce vertigo, and then dust the cavity with a mixture

of equal parts of tetraiodophenolphthalein and compound stearate of zinc. In addition, a careful study of the secretions should be made, polypi and excessive granulations removed and the stumps treated with silver nitrate. Caries of the ossicles calls for their removal when possible, but the author has often cleared up areas of caries by the use of enzymol with its dilute hydrochloric acid component. Reinfection of the middle ear must be guarded against by warning the patient against the improper blowing of the nose, and also by a careful investigation of the tonsil and adenoid condition. With careful conservative treatment, the author believes the necessity of a radical mastoid operation to be comparatively rare.

SNAPP, Grand Rapids, Mich.

THE ELECTRICAL REACTIONS IN FACIAL PALSY AFTER SUPPURATION IN THE MIDDLE EAR. A. LOWNDES YATES, Brit. M. J. **2**:1111 (Dec. 13) 1924.

The author describes a method of ascertaining whether a facial paralysis is due to necrosis of the bony wall of the facial canal or whether it is a "Bell's palsy."

The test must be carried out within ten days of the onset of the paralysis. It depends on the fact that, due to necrosis of the bone, the current can reach the nerve more easily than if the bony wall were complete.

The external canal of the affected side is filled with warm saline solution. A properly insulated electrode just fitting the canal is inserted. The indifferent electrode is placed on the opposite arm. The current is increased till there is a cathode closing contraction of the facial muscles. The number of amperes required is noted. The performance is repeated in the opposite ear and the difference in the current required for each side is shown.

In a normal ear it requires about 5 milliamperes, but in Bell's palsy of recent origin, 6 or 7 are required. In the paralysis following acute suppurative otitis media only from 1½ to 2½ milliamperes were necessary to secure a contraction in cathode closing. These results are obtained from examining thirty patients with Bell's palsy and five patients with paralysis from acute suppurative otitis.

The author thinks that paralysis does not occur in suppurative otitis media unless bony necrosis has allowed the pus to reach the facial nerve.

IMPORTANCE OF EARLY TREATMENT OF ACUTE OTITIS. JOHN F. O'MALLEY, Brit. M. J. **2**:1193 (Dec. 27) 1924.

The author looks to child welfare clinics and similar organizations to overcome the prevalent belief of the laity that a diseased ear is safe so long as it discharges. Acute otitis includes about 90 per cent. of the most serious ear conditions. The term is limited to conditions of the external and middle ear, labyrinthitis being used for the internal ear conditions.

Otitis of the external ear may be circumscribed or diffuse; if neglected it may lead to perichondritis of the pinna. The circumscribed type with the associated edema may simulate mastoiditis. Where it is impossible to distinguish them, it is pardonable to diagnose the more serious condition.

The many avenues of infection from the middle ear are shown, and there is a detailed list of the complications and sequelae given.

Deafness has an economic side owing to the incomplete education of these patients, and their inability to fill occupations where communication by sound is essential.

For treatment of acute otitis we must begin with the young children and watch for the early catarrhal conditions of the middle ear. This necessitates examination of the ears in every case. If there is any alteration in density, luster, color or of the cone of light, it should immediately determine the removal of the cause in the nose or throat. The early removal of the tonsils and adenoids in these children is the only hope of prevention.

In the acute otitis going on to suppuration, there are four stages described. In the fourth stage, or mastoiditis, it is definitely decided that the mastoid must be opened. There is not much uniformity in treatment of the earlier stages. The author asks about the advisability of tonsillectomy and how early it should be undertaken. He is of the impression that paracentesis in the serous stage, and early mastoidectomy in the persistent purulent or third stage tends to shorten the course of the disease and lessen the damage to the middle ear.

TREATMENT OF VERTIGO. ALBERT RAMSBOTTOM, Lancet **2**:1191 (Dec. 6) 1924.

Equilibrium is defined, and is said to be controlled by a center situated in the cerebellum. Afferent impulses come from the skin, muscles, joints, eyes and labyrinths. The afferent impulses travel through the superior cerebellar peduncles to the red nucleus, and from the red nucleus to the lower motor neurons. As the most important afferent impulses are those from the labyrinths, vertigo cases are classified into: Those associated with aural disease; those in which no aural disease is discoverable. Group 1: In all these, vertigo is due to disturbance of the labyrinth. It may be an irritative lesion of the external canal or middle ear. It may be an actual nonsuppurative destruction in the internal ear, nature not known, or it may be suppuration in the internal ear. With paroxysmal vertigo he considers Ménière's syndrome.

Where there is suppuration, surgical interference is indicated. In the nonsuppurative lesions the treatment is to care for all details of general health. The drugs suggested are iodids, bromids, strychnin, and quinin and the author finds quinin the most valuable in warding off an attack of vertigo.

Group 2: These are disturbances of the afferent impulses from sources other than the labyrinths. Errors of refraction are common causes of vertigo and their correction cures it. Neurotic vertigo is usually in neurasthenics. The treatment is that of the neurasthenia. In migraine watch for errors of refraction. Quinin is beneficial in these cases but phenobarbital may be necessary. Vertigo due to organic disease of the central nervous system is very difficult to relieve. When vertigo occurs in anemia and gastro-intestinal disorders, it is probably due to toxins and is relieved by giving calomel. The commonest causes of vertigo in this group are the circulatory disturbances. The treatment will be that of high blood pressure on the one hand or low blood pressure on the other. The iodids are beneficial in both types.

MCNALLY, Montreal.

PATHOLOGIC ANATOMIC CHANGES IN THE BLOOD VESSEL SYSTEM OF MAN WITHOUT GENERAL INFECTION. THE ORGANIZATION OF INFECTED AND NONINFECTED THROMBI. A. ESCH, Ztschr. f. Hals-, Nasen- u. Ohrenh. **9**:260 (Dec. 6) 1924.

In the cases described in the first and second installment, an infection governed the general disease and the local tissue changes. These originated from the middle ear and extended continuously to and into the membranous wall of the blood vessels, thus furnishing the most important factor for the development of the thrombosis. Also, the secondary changes of the thrombi themselves, regressive as well as productive, were entirely under the influence of the infection. The newly developed organization tissue resembled granulation tissue as we usually see it in infected wounds of the surface. This is, however, not always the case. In thrombi of the vein for instance, in a single instance an organization tissue is found which, in spots, resembles a mucous tissue. In the portal vein a tissue rich in vessels is found, which is looked on by some authors as hemangioma, by others as organized thrombus and by others even as an abnormality. The literature of pathology has extensively

discussed the question whether in so-called myxomas of the endocardium, we have real tumors or organized thrombi. In all these considerations, one point of view has not been considered, namely, what the underlying cause is that the organization tissue of thrombi can show such a varying structure. Are the presence or absence of an infection of importance? It is certain that infected thrombi are always organized by a tissue which resembles an infectious granulation tissue. Can we expect this tissue also when there is no infection? In order to approach a solution of this question, Esch investigated four cases in which marked changes of the circulatory system were only accompanying findings in other infections which lead to death. Clinically, there were no symptoms of a general infection. How did thrombosis occur in these cases? What was originally the main cause: the mechanical obstruction of the blood current, a change in the quality of the blood or inflammatory changes of the wall? Are the local tissue changes of the blood vessels to any degree influenced by an infection? If not, then a disease of longer duration will show in these cases whether a fundamental difference in the organization of infected and noninfected thrombi exists. The technic employed here is the same as employed previously. The blood vessels are left in connection with the petrous bone. Hematoxylineosin was used for staining, after the method of Van Giesen, if the tissue was to be examined more thoroughly.

Case 1.—A man, aged 30, a sublieutenant, suffered from a tumor of the epipharynx and mesopharynx, reaching into the soft parts of the right side of the neck. A specimen removed for examination showed a polymorph celled sarcoma. The general condition contraindicated an operation. Histologic findings in the right temporal bone showed no secretion in the outer meatus. The cutis was changed to a thick, partly infiltrated connective tissue pillow, rich in cells, in which entered some protrusions of the well preserved epidermis. At the adjoining bone, in some parts a thin layer of light red osteoid substance was found. The drum membrane was thickened in spots by a similar infiltrated granulation tissue, rich in cells. The tube and lower parts of the tympanic cavity contained a small amount of homogeneous exudate, mixed in a few spots with detached, swollen epithelial cells. The mucous membrane of the tube and tympanic cavity was much thickened all over, and especially in circumscribed spots at the medial wall of the tympanic cavity. Here swellings and polyps have been formed. The epithelial covering was preserved, and covered young connective tissue containing cells, which showed some isolated small epithelial cysts filled with mucus. This tissue filled the whole epitympanum, in which the intact ossicles were found. The circular ligament of the stapes, and the membrane of the round window were intact. The membranous labyrinth was not well preserved as to form but was without inflammatory changes. The nerves were not changed. The cells of the extensively pneumatized mastoid process were mostly filled with loose granulation tissue infiltrated in spots. In a few instances a small lumen was present, which was filled with homogeneous exudate. In the blood vessel channels, which were distended in the whole petrous bone, loose granulation tissue was found, which was more or less rich in cells. This reached continuously to the dura of the middle and posterior cranial fossae, to the membranous wall of the sinus and bulbus walls themselves which were thickened and softened. A thick network of newly formed bone was found toward the bulbus. It was sharply defined from the old bone. Bulbus and sinus sigmoideus were filled by a thrombus, which reached without demarcation the thickened, softened, noninfiltrated membranous wall. In the region of the bulbus, this thrombus was completely replaced by granulation tissue moderately rich in cells. Further toward the periphery, at the juncture of the bulbus with the sinus sigmoideus, the thrombus, arranged in layers, was still preserved. Blood cells were lying in varying numbers in the fibrinous structure. There were no signs of decomposition. Circularly, the thrombus was surrounded by a thin layer of granulation tissue which continued toward the periphery to the sinus sigmoideus and

filled this entirely in the specimen. The granulation tissue consisted in the main of young fibroblasts, in which an extensive formation of fibers could not yet be recognized. In spots it was richer and in spots poorer in cells. Here the cells had short protrusions, by which they were connected with one another. An irregularly arranged capillary net existed. Next to a few capillaries, a small cell infiltration could be seen. Only a few plasma cells and leukocytes could be shown. The tumor did not reach the examined parts of the petrous bone.

Esch thinks it most probable that the primary thrombosis of the jugular vein was caused by the ulcerated tumor. The thrombus then extended to the bulb and into the sinus sigmoideus. The contention that the thrombus in the bulb and sigmoid sinus show no signs of bacterial decomposition cannot weaken his idea, even if a bacterially decomposed thrombus is assumed in the jugular vein. The structure of an extensive thrombus can vary, so that it is not permissible to draw a conclusion from the composition of a thrombus at another spot.

Case 2.—A squamous epithelial celled carcinoma of the soft palate, extending to the pyramid of the temporal bone and the sphenoid. The peripheral thrombus was not in the specimen. The thrombus ended in the bulbus. The end of the thrombus was smooth and not decayed. The jugular vein showed no thrombus. It was differently composed in different parts. In the rest of the inferior petrosal sinus, it was almost completely organized and contained many cavities lined by endothelium which were partly filled with blood. In the sigmoid sinus and bulbus, the thrombus consisted of a tender net of fibrin with varying quantities of blood cells. In the bulbus the organization tissue was rich in cells (fibroblasts, leukocytes, lymphocytes, plasma cells). The cause of the thrombosis was the tumor and not the chronic middle ear suppuration.

The two other cases reported by Esch concern the cases reported from another angle by Lange. Case 3, a patient who was operated on in two stages, for cerebellopontile angle tumor, gliosarcoma, and Case 4, a patient who also was operated on for cerebellopontile angle tumor, glioma with softening. The further conclusions which Esch draws should be read in the original.

The Cilia of Corti's Organ and Their Relation to the Membrana Tectoria. Hans Held, Ztschr. f. Hals-, Nasen- u. Ohrenh. **9**:279, 1924.

Held claims that the cilia stop sharply at the lower surface of the tectorial membrane and do not enter the same.

Experimental Investigations Concerning the Importance of the Cranial Resonance and Cranial Bone Conduction. T. D. Demetriades, Ztschr. f. Hals-, Nasen- u. Ohrenh. **9**:296 (Dec. 6) 1924.

Demetriades comes to the following conclusions:

1. Dilatation of vessels through vasomotor paralysis creates an increase of the cranial resonance on the side of the paralysis.

2. The cranial resonance is diminished on the same side on which the sympathicus is irritated.

3. If in consequence of vasomotor paralysis, the reflex contraction of the blood vessels is eliminated, the resonance in the deeper lying portions is increased on account of the congestion.

4. The middle ear and the external auditory canal are of significance for the cranial resonance, but increased importance may be attached to hyperemia (either in consequence of simple dilatation of the vessels or in consequence of inflammation).

5. On auscultation by way of the cranium and by way of the external auditory canal, the same values are not always found.

6. So far as deductions drawn from experiments on animals can be applied to man, it can be said that the results of the examination of the bone conduction and its comparison with the air conduction (Rinne) are also partly dependent on the cranial resonance.

7. The vasomotors and the condition of the vessels may play an important part in regard to the shortening of the cranial resonance and in regard to the cranial bone conduction.

8. Changes of resonance explain certain cases of lesions of the acoustic nerve and prolongation of the cranial bone conduction, with negative or positive Rinne, like those observed by Alexander and Mahler, Lung and others (in congenital syphilis, and so forth), and by us in malignant tumors.

CONTRIBUTION TO THE VESTIBULARIS REACTION. CHAROUSEK and KRASA, Ztschr. f. Hals-, Nasen-u. Ohrenh. **9**:373 (Dec. 6) 1924.

The introduction of the weak caloric irritations by Kobrak is an essential enrichment of the investigation of the vestibularis, because it made a series of new observations possible. New questions present themselves. It is natural that in calorization some factors present themselves which are connected with extralabyrinthian irritation. The importance of the minimum irritation is based on the circumstance that a certain purifying of the experiment is accomplished simply on account of the choice of appropriate intensity values. With the increase of the peripheral intensity of irritation also those factors are increased in strength, which cannot be considered as pertaining solely to the reaction of the semicircular canals but they pertain also to the labyrinth. This refers to the vessel action and the change in intensity as it is produced generally by hyperemia and anemia. The authors intended first to establish the duration of the normal time of latency. Great differences were found in various people. They measured, in over 100 experiments, the time from the beginning of the irrigation to the first movement of the bulbus. The eyes remained directed forward and were observed with affixed spectacles of 20 diopters (Bartels), from 20 to 40 cm. of water of 20 C. were used in three seconds. The shortest time of latency was seven seconds (in a boy, aged 11 years) the longest fifty-five seconds. In a given case the age, psychic conduct, neurologic findings and other factors must be considered. The authors suggest accepting the time of five seconds as normal for the sake of comparisons. From 10 to 20 c.cm. of water of a gradually decreasing temperature (35, 30, 25, 20, 15 and 10 C.) should be used for five seconds each. If this is not followed by results, a continuous irrigation with water at 10 C. is used. The continuous peripheral irritation acts differently than the first quantities of water on account of the meanwhile changed central conditions. If the irrigation is continued during the reaction, then the expression of the central occurrences is lessened in their effect on the organ of demonstration, because there a collision occurs between the peripheral impulses and the central automatism. The authors tried to clear up this question experimentally.

Experiment 1.—A given amount of water of a given temperature was used in a given time. Eighty cubic centimeters of water were used with an ordinary ear syringe in six seconds. The time of latency, the intensity of nystagmus, the deviation reaction and past pointing were observed. A greater number of experiments had to be done because only one symptom was examined at the time. The degrees of temperature were 15, 20, 25, 30 and 35 C. It is necessary to proceed according to individuality and to determine in some preliminary experiments the temperature which creates in a given quantity (80 c.cm. water) a plain lasting reaction. First only nose and throat patients with healthy ears were tried, and only those who did not receive any medication, and after some time had passed since the operation, if an operation was performed. Twenty subjects were examined.

Experiment 2.—The time of irrigation was divided into two parts. After an intermission of at least two, mostly after from four to five hours, the experiment was repeated, but with a change. It is not advisable to wait longer, because variations of the caloric examination occur in the same persons at different times. In this experiment the same temperature, the same total amount of fluid and the same duration was used, but first only 40 c.cm. were applied, namely, half the amount in three seconds, then came an intermission, and then the other half was used. The intermission was once fifteen seconds, in other experiments twenty, thirty, forty-five, sixty and ninety seconds. From the beginning of the first irrigation, the authors paid attention to the same points as in Experiment 1. They also divided the amount into three parts, but abandoned these trials because the choice of the optimal interval proved to be difficult. The results of Experiment 1 were different from those of Experiment 2.

The divided (rhythmic) calorization is an irritation of a different valuation from the one produced by the application of the total amount at one time. The most favorable interval with most people is from twenty to thirty seconds. The time of latency gives the measure for the most favorable individual interval.

Nystagmus.—The moment at which the nystagmus stops cannot be noticed exactly. With many persons the after-nystagmus and the after-after-nystagmus is plainly visible. It follows the first nystagmus immediately and must be considered. After a single irrigation, the reaction showed a certain intensity and duration. With the divided irrigation, the nystagmus after the first portion was noticeably weaker. A few seconds after the second dose, it increased, reached a maximum of intensity and then disappeared gradually. Also after the second irrigation, a period of latency could be observed, but it appeared shorter than the first. Nystagmographic registration is necessary. The total duration of the nystagmus was greater in Experiment 1, if the interval was chosen correctly. If the interval was too short, then the result approached the result in Experiment 2; if it was too long the second portion furnished only a protracted nystagmus without increase in intensity. The authors also succeeded in impeding the reaction, and this circumstance is considered by them as a confirmation of the correctness of their way of thinking. The following case report is an example.

J. M., aged 13 years, had the right ear calorized. In Experiment 1, 80 c.cm. of water at 25 C. was used; the duration of irrigation was six seconds, period of latency (tried repeatedly) in an experiment thirty-three seconds, duration of nystagmus twenty-three seconds.

During the period of latency several processes take place. In consequence of the cooling of the semicircular canals, a sinking by pressure occurs. This moment cannot be determined. It certainly does not start with the beginning of the irrigation, but later. The peripheral irritation increases the central tonus, namely, a "loading up" of the centers. This is the period of subtonic sensitizing, according to Kobrak. At last the vestibular nuclei are charged to such a degree that a discharge occurs, and this occurs toward the eye muscles. Here the tonus increases and the period of latency ends only when the discharge of the nuclei of the eye muscle sets in. In Experiment 2, the first portion of water, 40 c.cm. at 25 C. is used for three seconds. Shortly before the end of the period of latency the second portion is applied. A typical nystagmus of short duration sets in, in the eightieth second.

In Experiment 1 nystagmus set in after thirty-three seconds through the irritation, repeated in the thirtieth second in Experiment 2, the central mechanism is clouded. The nystagmus expected in the thirty-third second cannot set in because a new charge sets in from the periphery. The consequence is that a certain time elapses until the central automatism asserts itself again. Meanwhile, however, the tonus has decreased to such an extent that the nystagmus is only of short duration. The result is a failure.

This case is an exceptionally good example for proving the impediment. These experiments require the correct choice of intensities of irritation and

their mutual relationship. Sometimes the impediment was very plain, in other cases the authors could only demonstrate that the second portion had no influence on the reaction created by the first portion. In this instance, the peripheral irritation applied at an improper time was not able to change the central action after it had once started. It could not further it nor impede it. If, however, the second portion is applied somewhat later after the passing of the period of latency, the vestibular centers have had time to transmit their charge toward the eyes. They are able to take up a new charge, and the second period of latency appears to be shorter than the first on account of the sensitization which still exists to some degree. The effect of the divided irrigation is such, under these conditions, that the same amount of irrigation, temperature and duration of irrigation caused a reaction of longer duration than the one-stage application. Another example: B. A., aged 17 years, with a healthy hearing organ, was irrigated on the right side. Experiment 1, 80 c.cm. of water at 20 C. was injected into the right ear in six seconds. Period of latency twelve seconds, duration of nystagmus one minute thirteen seconds. Experiment 2, 40 c.cm. of water at 20 degrees, was injected in three seconds, period of latency fifteen seconds. While the nystagmus lasts, the second portion is applied in the second half. The nystagmus increases perceptibly in intensity, reaches a maximum surpassing the degree of that in Experiment 1, and disappears after two minutes and thirty-three seconds. The duration of nystagmus is more important to the authors than the increase in intensity. The processes in the experiment just described are explained as follows. The second irritation is superimposed on the first, and the result is an augmentation of the effect. The superimposition, however, must occur at the right moment, not too early, as it otherwise disturbs the mechanism of discharge, and not too late, as it otherwise loses the character of superimposition. The authors claim that nystagmus cannot be considered as immediate expression of the course of irritation, but it illustrates only the central balancing phenomena, by the aid of which both systems aim at a position of equilibrium, and therefore it is a secondary phenomenon. The essence of the whole process is the course of the central vestibular irritation (which itself cannot be observed). Thus the authors are of the opinion that the central processes, as described, have their own time and their own rhythm, and that the process is a constant one independent of any peripheral irritation. A return or an approach to the norm does not occur simultaneously but with a difference of phases. The difference of phases is the cause of oscillatory discharge of the centers. The process has not stopped with the disappearance of the first central vestibulary irritation. The effect shoots beyond the mark because a reaction sets in from the centers of the eye muscles which are in a higher state of tonicity. Then follows a phase which is characterized by a change of direction and corresponds to the primary course, and so forth. On account of the reciprocating relations, the vestibular apparatus of the other side comes into play. The final suppression seems to be brought about not only through the gradual consumption of energy, but it is probable that the vestibularis center of the opposite side is influenced and acts in a compensatory manner.

Furthermore, the possibility must be considered that the phase of the vestibularis nuclei does not alternate exactly with that of the eye muscles. After a few changes of the phases, a shifting of the phases takes place and oscillation is abolished. Demetriades and Mayer attribute more importance to the time of latency than to the duration of nystagmus. Charousek and Krasa reached a similar conclusion. The time of latency gives an idea concerning central automatism, although only in a rough way. It is the sum total of the peripheral latency, the central latency of the vestibularis and the nuclei of the eye muscles. The importance of the duration of nystagmus is much smaller, but it is also of value if its relation to latency is considered. The time which results from the latency plus duration of nystagmus is looked on by the authors as the time constancy, in which the whole automatism of the central oculovestibular reaction is expressed after deduction of the periph-

eral latency which, however, is as yet an unknown factor. The greater the portion of the total time, which is taken up by latency, the less time is left for nystagmus and vice versa. Further investigations must be made concerning the relation of the duration of latency and of nystagmus, because many factors enter into consideration. The results so far obtained make it probable that the vestibular reaction is not simply an effect of vestibular irritation on the various systems connected with this apparatus. A reciprocity of relations exists in one direction, which guarantees a characteristic course of reaction. In this sense it seems justified to look on the central vestibular and oculomotor apparatus as a unit in regard to function, namely, as an oculovestibular central organ.

The authors summarize their considerations as follows:

The central process of irritation, once started, takes its course in a constant rhythm of its own, according to a certain law.

The time of latency of the centers involved, as well as the time periods in which their discharge takes place, represent also (individual) constant items.

Owing to this arrangement, a difference in phases between the participating nuclear regions always exists (oscillatory discharge). This is the central substratum of the turn of the peripheral reactions which can be observed in the affected organs.

By choosing the proper time in which new peripheral irritations can be used, when there is already a reaction present, an increase or decrease of the effect is possible.

The vestibular reactions, therefore, are not the pure expression of vestibular irritation per se, but the reflex picture of the central corrective events, which later begin to occur through a disturbance of the answering effects at the oculovestibular apparatus.

The authors tried to do justice to the character of the relations described by them by collecting the factors to be considered under the term "oculovestibular central organ."

IS THE LABYRINTHIAN FISTULA SYMPTOM AN OTOLITH REACTION OR NOT? C. O. NYLÉN, Ztschr. f. Hals-, Nasen- u. Ohrenh. **9**:398 (Dec. 6) 1924.

Recently, S. H. Mygind presented an otolith theory as an explanation of various labyrinth fistula and pseudofistula symptoms. Nylén expressed the idea that the otolith organs probably did not play a decisive part in originating the fistula symptoms by pressure. At that time the microscopic examination of the labyrinth had not been completed. This has now been done. The main finding in the labyrinth of a guinea-pig, which was centrifuged and operated on (erosion of the horizontal semicircular canal), revealed no otolith reflexes but typical fistula symptoms by pressure. The utriculus otoliths were torn from the macula and the sacculus macula was bare, with the exception of a totally insignificant region where otoliths still were hanging. There was no finding of importance at the crista ampullaris. Yet the nerve epithelium under the otolith membrane was not put out of commission. On examination of the fistula and pseudofistula symptoms, the pressure in the labyrinth was increased and decreased, and it did not seem improbable that an irritation of the otolith organs took place. On constant irritation, a tonic deviation must occur and not a transitory nystagmus (Magnus and de Kleijn), as it occurs when ordinary fistula and pseudofistula examination is made (compression and aspiration in a passing or continuous manner). Now, if the pressure in the labyrinth is not lowered by a constant pressure in the meatus (no squeezing out of fluid through the aqueduct, etc.), how will Mygind explain, by the aid of the otolith theory, that the nystagmus suddenly changes so frequently after from ten to twenty seconds and stops after just so many seconds? If there is an erosion of the lateral semicircular canal, or if a syphilitic labyrinthitis is present, the nystagmus can sometimes be vertical. This may be

caused by an injury of the horizontal ampulla, or of certain parts of the macula. The less frequently occurring reversed fistula symptom, on direct pressure on an erosion of the lateral semicircular canal, can be caused as well by an interlabyrinthian change which prevents the normal extension of pressure to the horizontal ampulla, as it can be caused by an injury of the nerve epithelium of the macula with a diminished power of reaction by pressure. The slow phase of nystagmus, or the deviation of the eyes in compression or aspiration in the canal, or the pulse synchronic eye movement can be reactions of the otoliths or of the semicircular canals. While Mygind's otolith theory sounds alluring, Nylén does not believe that it furnishes a better explanation of various fistula and pseudofistula symptoms than other theories of an older date. The experiments carried on so far can prove neither the correctness of one or the other theory, although they demonstrate that the otolith membrane (and perhaps also the otolith organs) are not necessary conditions for the creation of a fistula symptom by pressure, at least not in the guinea-pig. They point to the fact that the fistula and pseudofistula symptoms principally and essentially are set in action by the semicircular apparatus.

How Does the Labyrinth Fistula Symptom Originate? Answer to Dr. Borries. S. H. Mygind, Ztschr. f. Hals-, Nasen- u. Ohrenh. **9**:401 (Dec. 6) 1924.

Borries has quoted himself incorrectly. He drew parallels with the vascular fistula symptom when he talked about the importance of the vascular conditions concerning the difference of the effects of warm and cold in caloric nystagmus. He said: Some investigations in 1919 showed that simple stasis (for example, by putting a rubber tube around the neck or by letting the patient use strong abdominal pressure) created the same kind of nystagmus, and that the very same occurred when patients inhaled amyl nitrite. Therefore I conclude that Mygind's fistula phenomenon is caused by hyperemia; second, that hyperemia of the labyrinth might cause a nystagmus to the opposite side. I also state that I do not consider the vascular nystagmus, in these cases, caused by the fistula, but as a general labyrinth reaction, a viewpoint which I hold also concerning the ordinary fistula experiment." Mygind continues that the reader must receive the impression that in naming "general labyrinth reaction" contrary to "fistula" only general vessel changes of the labyrinth are understood, contrary to vessel changes of the fistula, and that it is not mentioned whether the final reaction is caused by the crista or by the otoliths. Therefore it is quite a bold assertion to state that Borries, years ago, had published a theory which coincides essentially with that of Mygind. In 1923, Borries published an article of thirty-nine pages, and never mentioned the possibility that the otolith organs played any part concerning these phenomena. It was also not mentioned that a "universal labyrinth reaction" might be present.

Concerning the Doctrine of Otogenous Abducens Paralysis. K. Ulrich, Ztschr. f. Hals-, Nasen- u. Ohrenh. **9**:403 (Jan. 20) 1925.

The cause of abducens paralysis is still a much discussed question. Gradenigo, about twenty years ago, assumed an osteitis of the tip of the petrous bone with an extradural affection of the nerve. Various theories were expressed by other investigators. Lange and Vogel decline to accept Gradenigo's theory, the former on account of anatomic considerations, the latter through clinical considerations. Lange thinks that abscesses at the tip of the pyramid without abducens paralysis speak against Gradenigo's views. Knick is quoted, who carefully observed, clinically, five cases in which the spinal fluid was examined systematically. With the exception of one patient, there were no chemicophysical or cytologic signs of meningitis, also the pressure of the spinal fluid was normal.

According to Knick, the negative finding speaks against meningeal origin and for extradural toxic injury of the abducens. The discussion which followed stated that a definite decision could be made only by pathologic anatomic investigation. Ulrich reports results on a patient who was carefully observed, with necropsy findings.

History.—A man, aged 45, suffered off and on in childhood from middle ear inflammation, but not in the last thirty years. His hearing on the left side, however, was not so good since that time. Ozena, existing for years, was treated by the patient with irrigations. On Feb. 20, 1923, after physical exertion, an earache suddenly developed on the right side. The temperature rose to 100.4 F., and the patient immediately consulted a specialist. March 14 the patient was referred to the university polyclinic with the report that a paracentesis was done on February 24, on account of otitis media with mastoid affection. Following profuse suppuration, slowly decreasing since that time, the mastoid tenderness disappeared, and the temperature returned to normal. The general condition of the man was better. Treatment had consisted of boric acid therapy, after the method of Bezold, catheterizing, and an icebag applied to the ear. The posterior wall of the meatus never sagged. March 16 the patient complained of radiating pain on the whole right side of the cranium. There was no tenderness on pressure over the right mastoid process, and the meatus was not sagging. There was free mucopurulent secretion which was not fetid. The drum membrane was pale red and bulging; the hammer handle could not be differentiated. There were perforations the size of a pin head in the posterior upper quadrant, with a continuous droplike discharge, observed especially by the method of Valsalva. The left ear, surroundings and meatus were normal. The drum membrane, otherwise normal showed an intermedial calcification in the posterior half.

Anterior rhinoscopy showed marked atrophy of the lower and middle turbinates, no crust formation, no odor (self treatment with irrigations). Nasopharynx, larynx and trachea were normal. The region of the jugularis was normal. Bulbus movements, eyegrounds, pupillary reaction, sensibility of the skin and function of the facial nerve were normal. The hearing distance for whispered voice was 0.1 cm. in the right ear and 400 cm. in the left ear. After catheterization, the hearing for whispered voice ranged from 40 cm. in the right ear to 400 cm. in the left ear.

Functional examination of the vestibular nerve: Caloric test, pastpointing and falling reaction were typical on both sides. There was neither spontaneous nor compression nystagmus. The thorax and abdomen were normal; urinalysis showed no sugar and no albumin. On March 20, there was severe radiating pain in the right temple. There was no pain in the ear, no throbbing synchronous with the pulse. Temperature was 99 F. in the morning, in the afternoon, 100.4 F. March 21, the temperature in the morning was 102.2 F., pain in the temple increased, the mastoid process was somewhat tender. There was no rigidity of the neck and no Kernig sign.

On account of long duration of secretion, pain and fever, an operation was performed, which disclosed a mastoid process markedly pneumatic and hyperemic, thickened mucosa in cells and no free pus. The sinus was exposed to the length of 3 cm., the surface was smooth; aspiration revealed blood. The middle cranial fossa was exposed. The dura was smooth and pulsating. In the antrum, liquid pus and granulations were found. No fistula was found leading into deeper structures.

Histologic examination of the granulations by Professor Hedinger showed chronic granulation tissue and bone splinters with osteoid borders.

March 23, the dressing was changed. A purulent secretion was found in the meatus. There was a less severe neuralgia of the first and second branch of the fifth nerve.

March 24, there was no fever. March 31, neuralgia of the fifth nerve persisted. The ear was dry. Hearing distance of the right ear was 300 cm. for the

whispered voice. April 3, the temperature rose to 100.6 F. Leukocytes, 17,000. The patient declared he saw double, looking to the right. The sensibility of the cornea was diminished on the right side. Dr. Kaelin, ophthalmologist, reported abducens paralysis on the right side with the fundus normal. Neuralgic pain was not confined to the right side of face, but was also noticed in the region of the major occipital nerve. There were no rigidity of the neck and no Kernig sign. Reflexes were not increased (Dr. Liebmann). April 5, total abducens paralysis of the right side and photophobia yielding to occlusion of the right eye were present. April 9, decrease of neuralgia, partial return of corneal reflex (Dr. Kaelin), no fever. Leukocytes 7,000, drum membrane pale. Hearing for whispered voice 500 cm. April 12 to 14, the temperature rose to 99.7 F. in the evening, with pain in the occiput and in the eye. Leukocytes were 12,000. From April 14 on, the patient was continuously afebrile. Hexamethylenamin medication was given, artificial perspiration was induced, and a decrease of all alarming symptoms was noted. Pain in the eye and occiput disappeared. The retro-auricular wound was almost closed; the drum membrane was entirely clear. Hearing distance was more than 12 meters for whispered voice. Leukocytes were between 6,000 and 8,000. Only the abducens paralysis remained. April 17, after a walk the patient had a sudden attack of dizziness, vomiting and diffuse headache. There was no nystagmus. When a physician was called, April 18, the patient was found somnolent, with very pronounced rigidity of the neck, a positive Kernig sign and increased reflexes present. Lumbar puncture was done by Professor Nager, and a purulent fluid was obtained under increased pressure. The hygienic institute reported pure culture of *Streptococcus mucosus.*

In view of the grave meningitis there was no further interference. April 21, the patient died, exactly three months from the beginning of the disease. Necropsy of the cranium showed, among other findings, thick creamy pus in the subarachnoid space in the upper median parts of the cerebrum, also in both sylvian fossae. The dura mater over the right petrous bone was macroscopically without change. Nowhere could the extension of the ear disease to the pia and arachnoid be seen. The right temporal bone was removed and examined microscopically. An extremely developed pneumatization of the whole petrous bone was found. The large spaces reached from the middle ear and roof of the antrum backward between the semicircular canals.

1. The dura covering the ridge of the pyramid was normal on the cerebral side, also at the attachment of the tentorium and on the posterior surface of the petrous bone, up to the contact with the surroundings of the abscess on the anterior surface of the petrous bone the dura was hyperemic all over and not firm. Where it was in direct contact with the air spaces, blood vessels emanating from the dura penetrated into the connective tissue of the cells. The cerebral side of the dura was intact except at the spot of perforation. There was pachymeningitis externa at the abducens channel, and under the gasserian ganglion.

2. The bone of the whole retrolabyrinthian region was extensively pneumatized, especially on the anterior plane of the pyramid. The bone was much more compact toward the posterior cranial fossa. Beginning at the upper ridge of the petrous bone, all pneumatic spaces were entirely filled with concentrically arranged connective tissue. The sections embraced the petrous bone and showed the bone at the tip in the main filled by young connective tissue. This organized abscess reached from the labyrinthian capsule to the ascending part of the carotid, and from the anterior wall of the inner meatus to the dura of the middle cranial fossa. The bony cell walls were rare here. Only the concentric arrangement of the connective tissue still showed the former structure of the large celled pneumatized tip of the petrous bone. Everywhere were osteoid borders, some walls were newly formed. The lateral border of the focus, the labyrinthian capsule was totally unchanged, but the extreme tip of the pyramid, the part between the gasserian ganglion and sella was entirely

absent. At the roof of the petrous bone purely connective tissue was found, and it could be seen that with increasing depth the connective tissue became richer in blood and cells. In the midst of the single foci, collections of pus could be seen. The abscess approached the posterior wall. The osteoid borders disappeared, and in their places the osseous wall was surrounded by long rows of osteoclasts. Still further in the depth two separate abscesses could be seen separated by a typical membrane. The second abscess was on the posterior wall of the pyramid under the spot where the inner meatus started. It became smaller but approached more and more the dura of the posterior cranial fossa. Gradually the dura was permeated by round cells from the inside and was perforated like a funnel at the deepest spot of the pus focus. The perforated space was about 0.5 mm. wide and a little more than 1 mm. high.

Comment.—The question arises whether in this patient meningitis was present at the time of the abducens paralysis. Unilateral pain in face and occiput, a certain degree of photophobia and abducens paralysis were present. The trigeminus neuralgia is explained by the inflammation of the gasserian ganglion. The pain in the occiput is easily explained by the innervation of the dura and the tentorium by the trigeminus and by the circumstance that these neuralgias are frequently accompanied by those of the cervical plexus. It can be assumed that in this case no circumscribed or diffuse meningitis existed at the time of the abducens paralysis, and also not during the following forty-five days; but they occurred three days before death, through a sudden perforation of the dura by the epidural abscess. Concerning the pathway of infection, Ulrich remarks that Gradenigo assumes an infection of the retrolabyrinthian region by way of the peritubal cells and the carotid channel. This can happen and has been proved histologically by Brock. Gruenberg and Lange described the possibility of infection by way of the perilabyrinthian cells, Uffenorde along the median antrum wall, Habermann through the subarcuate fossa and lately Papale pleads for a lymphangitis between the hypotympanum and the sheath of the abducens. Ulrich quotes only temporal bones which have been examined microscopically. In his case the pathway of infection could not be established with absolute certainty. It is probable that the way led over the roof of the antrum and the labyrinth along the anterior surface of the pyramid. In general, Gradenigo's conception has been borne out in this case. If in patients with otogenous abducens paralysis, signs of serous meningitis are found, it does not mean that the serous meningitis is the cause of the paralysis. Abducens paralysis is missing in many instances in cases of otogenous serous meningitis, therefore it can be assumed that serous leptomeningitis and abducens paralysis are two parallel symptoms of a third common cause, namely, of the focus of inflammation at the tip of the petrous bone. It is naturally conceded that an abducens paralysis in the presence of a middle ear disease can also be caused by a circumscribed or diffuse meningitis.

Therapy.—Even if we assume that an inflammation of the tip of the petrous bone is the cause of the disease, it does not furnish per se an indication for an operation (Knick). Not every inflammation is an empyema, not every empyema leads to perforation into the brain (according to Scheibe, 37 per cent. of ear empyemas heal spontaneously).

Experience has taught that by far the greater majority of these conditions clear up entirely. One must be careful in choosing patients for operation. The exposure of the tip of the petrous bone is a dangerous procedure, whether the method of Krause or Streit is used or whether one proceeds by the translabyrinthian route. A reputable surgeon like Moure lost all patients of this nature on whom he operated. Knick (*Transactions of the German Nose and Ear Surgeons*, Wiesbaden, 1922, p. 136), and the discussion of Beck and Ruttin (ibid., p. 136) state when the primary focus in the middle ear should be attacked. As a rule the paralysis developing after a mastoid operation is

considered prognostically unfavorable. This, however, is not correct without reservation, because there are numerous communications in the literature showing a cure without further interference. Ulrich saw such a patient after a radical mastoid operation. Abducens paralysis and neuralgia of the fifth nerve developed. After five days the symptoms disappeared. In view of the first patient described, whose life might perhaps have been saved, although the course seemed to justify noninterference, the author would act, at the next occasion, as follows: If an abducens paralysis and neuralgia of several branches of the fifth nerve develop after operation on the middle ear, and if the latter increase is accompanied by new, even if slight, increases of fever, then the moment for interference has arrived. Just this rise in temperature for several days, which coincided with the increased intensity of the symptoms of the fifth and sixth nerves, might have suggested that there existed an empyema still active at the tip of the petrous bone and not a decreasing inflammation. This however, furnishes only the indication for this special case. More material and greater experience will throw more light on the advisability of surgical interference in Gradenigo's complex of symptoms.

AMBERG, Detroit.

PNEUMATIZATION AND CONSTITUTION. W. ALBRECHT, Ztschr. f. Hals-, Nasen- u. Ohrenh. **10**:51 (Nov. 8) 1924.

The relation between pneumatization of the mastoid and resistance of the mucosa (as the author now accepts it) appears to be contradictory to the old idea of constitutional inferiority of the mucosa. The author calls attention to hereditary tendency to mucous membrane inflammation, and reports (with diagrams) a number of families in which middle ear suppuration appeared in three generations as a dominant characteristic. He makes the further observation that middle ear suppurations are far commoner in infants who are artificially or improperly fed, and that the same is true of the exudative diathesis. In a series of infants treated in his office only 14 per cent. were breast fed.

The author also finds a definite relationship between middle ear inflammations and arrested pneumatization, and asks wherein lies this relationship between constitution and pneumatization.

Investigation revealed the following: ten healthy persons without exception had normal mastoids; ten with the exudative diathesis showed twelve times marked arrest of pneumatization; five partial arrest; three normal pneumatization. He then investigated twenty-two uniovular pairs of twins, in whom one would naturally expect identical facial and cranial configuration even to individual cell formation. Sixteen pairs showed identical mastoid formation. Six pairs showed some unilateral, some bilateral differences, and in each case the brother who showed arrest of pneumatization had either chronic nasopharyngeal catarrh or enlarged tonsils, the twin partner being normal.

He then speculates that, if we accept Witmaack's idea that arrest of pneumatization is due to infantile otitis induced by entrance of amniotic fluid, there are two possible explanations: (1) that entrance of amniotic fluid causes inflammation and consequent arrested pneumatization more readily in constitutionally inferior tissues; (2) the otitis is a mild grade concomitant of the nasopharyngeal catarrh of the exudative diathesis. Possibly all these factors are synergistic. Cooperation with pediatricians in promoting breast feeding is advised.

MIDDLE EAR SUPPURATION AND PNEUMATIZATION. W. ALBRECHT, Ztschr. f. Hals-, Nasen- u. Ohrenh. **10**:55 (Nov. 8) 1924.

The author, formerly skeptical of Witmaack's theory that failure of pneumatization of the mastoid is due to infantile otitis, studied 350 cases of roentgen-ray pictures of middle ear inflammations. If due to chronic suppuration of later life, then old cholesteatoma cases should show greater density of

the mastoid than early cases. They were unable to show this, but on the contrary the same picture prevailed in practically all cases. One scarlet fever patient with suppuration without cholesteatoma showed a large mastoid, dense peripherally, without the forward lying sinus, and with a few broken down cells centrally, suggesting a late sclerosing process. In cases of compact mastoid without suppuration, twenty-nine patients were found, of whom twenty-four had cholesteatoma suppuration in one ear, both mastoids being sclerosed, showing the characteristic picture, namely, compact bone behind the canal, with a sharply outlined, forward lying sinus. Altogether, in fifty-three cases, only two were found in which possibly the sclerosing process might have been due to suppuration later in life. As to the question of sclerosis being merely a harmless physiologic anomaly, they easily picked out of their material thirty-seven patients in whom the two mastoids were definitely different in development. According to Wagener's investigations, physiologic variations in cell development are bilateral.

Clinical summary: Sixty-three cholesteatoma cases, all compact mastoids; twenty-four chronic suppurations without cholesteatoma, some postscarlatinal and some perhaps tubercular: twenty compact mastoids, four partial arrest of pneumatization.

Fifty-eight acute suppurations: thirty-three healed without complications; of these, twenty-six patients had normal mastoids, seven arrested pneumatization; twenty-three developed mastoiditis; of these twenty-one had normal mastoid development and healed readily. Two were arrested cases, of which one patient had to be reoperated for fistula. Two patients with partially arrested pneumatization died, one of meningitis and one of bulb thrombus, eventuating in meningitis in spite of free operative exposure. Of the fifty-eight patients there were, in all, eleven of partial or total arrest, and among these eleven were the two fatal cases and one complicated case.

Twenty-three cases of mucous membrane and subacute suppurations showed thirteen partial arrests and nine compact mastoids, one normal pneumatization, and this one suspect of scarlatinal origin.

With these findings, the author thinks a definite relation is shown between pneumatization and lack of resistance of the mucosa, thus supporting Witmaack, and he recommends the use of the roentgen ray not only because of its diagnostic value, but particularly for its prognostic value in acute suppurations.

In the discussion which followed, Dr. Kuemmel said it would be interesting to study heredity. Probably the milder, overlooked conditions are the cause of pneumatization.

According to Dr. Manasse, in every chronic inflammation of the middle ear, bony new growth is found. To this, Albrecht replied that it was not demonstrable by roentgen ray.

Dr. Runge said that Witmaack accepts the effect of constitution as well as inflammation as a factor in pneumatization. Turner reports studies of 1,000 heads. He believes the type of skull, whether dolichocephalic or brachycephalic influences pneumatization; also climate. One hundred per cent. development is found among Polynesians, Melanesians and Eskimos, while European Islanders (British and Irish) show a large proportion of disturbances. (The arctic region is notably free of respiratory infections except where introduced by civilization. Also probably in primitive races the unfit die off more readily. A. L.)

Dr. Knick observed twenty-five patients for ten to twenty years, who had had otitis media in their first year, showed arrest in eight cases and doubtful variation from normal in nine cases. Probably the nonperforating inflammation causes greater arrest.

Dr. Voss said he found lack of resistance of the mucosa regularly in his investigation of premature infants. Perhaps purulent rhinitis of fetal life is also a factor. The proper feeding is important.

HEARING FOR SIBILANTS. W. ANTHON, Ztschr. f. Hals-, Nasen- u. Ohrenh. **10**: 92 (Nov.) 1924.

The hearing for F, S, Sch and Ch (German palatoguttural) was tested in various types of deafness. The normal ear hears these sounds accurately when whispered at a distance of 6 meters. At 20 meters there is some confusion. While the author's investigations were of academic rather than clinical interest, the following may prove of clinical value: In pure nerve deafness (nonsyphilitic) Sch was heard furthest, then S, Ch and usually least of all E, although both the latter were barely heard accurately.

In syphilitic nerve deafness, these relations were reversed to the extent that Sch was heard the poorest.

In cases of conduction deafness, or where this condition was present with nerve deafness, there was no difference in the hearing distance for these various sounds, namely, the hearing for all of them while diminished was not definitely more so for any one of them.

URIC ACID IN NERVE DEAFNESS. TIBOR GERMAN and GEORG KELEMEN, Ztschr. f. Hals-, Nasen- u. Ohrenh. **10**:175 (Nov.) 1924.

Forty-two patients were examined; of these, eighteen showed excess of uric acid in the blood; 3.5 mg. per hundred cubic centimeters of blood was taken as normal maximum, the Folin-Neubauer colorimetric method being used after three days purin-free diet. All patients in whom other possible etiologic changes were seen, such as syphilis, trauma, lead and nicotin poisoning, senility or hysteria, were excluded. Twelve of the patients had other symptoms of gout, such as arthritis, and were put on a purin-free diet. Nine of the patients were retested for blood uric acid and showed a return to normal, with one exception, who also showed no improvement. Of these nine, four improved greatly in hearing, four were uninfluenced; four were greatly relieved of tinnitus, two of vertigo, one of insomnia caused by tinnitus. Of the three who were not retested for uric acid one did not return; one reported relief of headache, noise and vertigo; one improved in hearing in one ear only. The only one of the nine not relieved was the patient in whom the blood uric acid remained above normal (4.4 mg. per hundred cubic centimeters of blood). In one patient the condition was of several weeks' duration, in another of several months and in the others of one to many years.

THE ETIOLOGY OF NECROSING LABYRINTHITIS. O. STEURER, Ztschr. f. Hals-, Nasen- u. Ohrenh. **10**:109 (Nov. 8) 1924.

The author follows Zange's classification of (1) inflammatory labyrinthitis; (2) necrosing suppurating labyrinthitis. The second state is only secondarily purulent, the necrosis being the result of increased pressure (fluid) on the soft tissues, lowering their resistance to the subsequent entry of infection. In animal experiments, irritant metals were carried from the tympanic cavity into the labyrinth by electrolysis. The animals killed early showed necrosis of the soft parts, and increased fluid without cellular exudate; those killed later in the process showed secondary inflammatory action, due to demarcation reaction. A case is reported of mild middle ear inflammation, followed on the eighteenth day by a marked labyrinth syndrome without fever. Serous labyrinthitis was diagnosed and the patient was not operated on, but suddenly meningitis supervened, which was fatal in two days. This patient showed hyperplasia of the mucosa of the round window with cystic degeneration, associated, as outlined by Witmaack, with lack of pneumatization of the mastoid. The author believes that the condition of the mucosa of the round window is an important factor in bringing about the process described in the foregoing, and calls attention to Witmaack's statement that this type of hyperplasia of the mucosa is always associated with disturbances of pneumatization.

CIRCUMSCRIBED LABYRINTHITIS. E. SCHLANDER, Ztschr. f. Hals-, Nasen-u. Ohrenh. **10**:117 (Nov. 8) 1924.

This is a study of eighty-three patients with fistula symptom in the Neumann clinic. The principal locations of fistula are the outer wall of the horizontal canal and of the promontory. The former are much more frequent because connective tissue protection between the bony wall and membranous labyrinth is greater, whether erosion takes place by granulating osteitis or by pressure of cholesteatoma. Three patients were noted in which fistula symptoms developed some weeks after radical operation, which had evoked no immediate disturbance. These are supposedly due to interference with blood supply by removal of the mucoperiosteum during the operation.

When present, spontaneous nystagmus is usually rotatory and toward the diseased ear, and tends to diminish, while the nystagmus of retrolabyrinthine origin is stationary or increases, but exceptions are noted. Undulatory nystagmus is described by a number of authors as occurring, also nystagmus synchronous with the pulse. The latter is explained by the systolic filling and subsequent emptying of hyperemic inflammatory tissue causing endolymph movement.

Sixty cases were typical, thirteen atypical, two vertical, four changeable; three patients had no nystagmus but vertigo and pastpointing; one was typical head nystagmus. The atypical cases are supposedly due (Ewald) to location of the fistula at the promontory or the oval window. One, reported by Ruttin, was in such a peculiar direction in the external canal that the usual endolymph movement would be reversed.

If the ear is unhealed, the fistula symptom may persist for years; six of the patients developed diffuse labyrinthitis; of the five operated on, three died. A number of patients improved greatly in hearing and six somewhat; twenty-eight remained stationary, and seventeen became deaf.

Treatment: In acute cases, especially if due to capsulated cocci, immediate operation is advised. In chronically ill patients with fair hearing and good drainage, free of granulations, labyrinth function present, the author recommends conservative handling. If the labyrinth process is progressive, radical operation; likewise if the canal is narrowed by either bony changes or polyps causing retention, and certainly in the presence of any intracranial symptoms. In postoperative generalized labyrinthitis operation is performed on patients with a suppurative condition, but not on those with a serous inflammation. In the patients with fistula symptom but no other evidence of function, if the radical mastoid operation discloses definite lesion of the labyrinth wall, the labyrinth operation is also immediately performed.

In the discussion which followed, Zange said he believed that while anatomic variations are a factor, the deciding factors are the toxins and germs that find entry to the inner ear.

Knick believed that the best guide for operation on the labyrinth is the cerebrospinal fluid.

Hinsberg said that he has given up dependence on the spinal fluid. He operates on the labyrinth in every patient who has total loss of function. Patients with circumscribed labyrinth inflammation should not be operated on. In these patients operation is dangerous and unnecessary.

Jansen said he depended on hourly observation of the course of the disease. Rapid increase in the labyrinth symptoms indicates operation.

Albrecht said he believed that spinal puncture should not be made immediately but within twenty-four hours.

Neumann says that spinal puncture is better in theory than in practice because of rapid changes therein. He operates as soon as function is totally lost, except in those patients in which function has been destroyed long ago.

SURGERY AND AFTER CARE OF TEMPOROSPHENOIDAL ABSCESS. O. BECK, Ztschr. f. Hals-, Nasen- u. Ohrenh. **10**:219 (Nov. 8) 1924.

Statistics of large clinics alone are useful in judging results of treatment methods. Since 1907 in the Neumann clinic there have been eighty-two temporosphenoidal abscess operations, with twenty recoveries. Forty-one patients with cerebellar abscess were operated on, with fatal results in all. Three recent cases of extensive temporosphenoidal abscess are described in detail, in which, because of progressive encephalitis after drainage in the usual location at the base, and apparently hopeless outlook, a counter incision was made with through and through drainage from a point further up and back in the direction of extension. One of these patients, apparently hopelessly ill, recovered and the other two showed an unexpected remission immediately following the counter incision but eventually died. The author believes that counter incision should be practiced in all cases of large abscesses or spreading encephalitis which are near enough the surface to be reached without going through healthy tissue. This is determined by exploration with the little finger. Incidentally a piece of dura is excised. Dressings are done as necessitated by drainage problems only.

In the discussion, Denker said that he practices wide opening of the abscess cavity, spreading the aperture with a Killian speculum, antrum cannula irrigation with physiologic sodium chlorid or boric solution, strength 4 per cent., careful drying under eye control and powdering the cavity with boric powder. A glass drainage tube is used, the treatment is done daily, and tubes changed as the cavity shrinks. Under this treatment eleven temporosphenoidal abscesses gave four recoveries; nine cerebellar abscesses five recoveries. The after-treatment must be done by an experienced surgeon, and with the patient in the upright position.

LEWY, Chicago.

REPORT OF CASE OF CONGENITAL PSYCHICAL DEAFNESS. TAMM, Acta Pediat. **4**:110 (Oct. 25) 1924.

Dr. Tamm reported a case of congenital psychical deafness. The patient was a child, aged 5 years, whose family history was negative except for the fact that an elder sister stuttered in childhood, and the mother had been depressed and restless during pregnancy. The personal history was negative up to the age of 1 year, when the parents noted that he was making no progress in speaking, did not understand much of what was said to him and did not hear many noises.

Physical examination was negative except for hyperactive reflexes, some facialis phenomena, and the tickling reflex in the external auditory canal. The drums were slightly clouded and retracted. Caloric tests revealed a normal vestibule but hearing could not be satisfactorily tested.

The patient was quite lively, handling himself well, and seemed intelligent for his age, though noisy and restless. He had good conception of form, colors and numbers, but took very little interest in sounds, many of them apparently meaning nothing to him. Other sounds, principally words, he understood fairly well. He repeated many words in a parrot-like fashion and used a few words in the proper sense but his understanding of common words was very limited. Many of the common sounds were quite unknown to him and if by constant repetition he was made to understand them he soon forgot them.

The author considers the case one of congenital psychical deafness, (sensorial auditory dumbness), complicated by dulness of hearing, and attributes it to arrested development of the center for sound perception. From deaf mutism it is distinguished by the presence of the tickling reflex in the external

auditory canal, the motor restlessness, and the wildness, all these things being due to the discharge of nerve energy generated by inflowing auditory sensations, energy which in the normal person is discharged through normal speech.

CONNOR, St. Paul.

Pharynx

TUBERCULOSIS OF THE TONSILS AND ADENOIDS. P. B. MACCREADY and S. J. CROWE, Am. J. Dis. Child. **27**:113 (Feb.) 1924.

Routine histologic study of 3,260 tonsillectomies, done at the Johns Hopkins Hospital between 1912 and 1921, demonstrated the tubercle bacillus in the tonsils or adenoids of 138 patients. Of the 138 patients, forty-six had tuberculous cervical glands, proved by microscopic examination; ninty-two patients with tuberculosis of the tonsil or adenoid had no general or local manifestations of the disease.

An attempt was made, through a periodic roentgen-ray examination of the chest and general physical examination, to determine the ultimate result in those patients who had an apparent primary tuberculosis of the lymphadenoid tissue of the throat. Fifty patients were followed for a period ranging from two to ten years and the following findings are of interest.

Two of the fifty subsequently developed tuberculosis of the cervical lymph glands. In three cases a specific infection of the mediastinal glands was diagnosed by roentgen ray but did not interfere with the growth and development of the patient. Five patients later developed pulmonary tuberculosis, only one of these, however, showing any clinical evidence. This one recovered completely.

There were two cases of tuberculosis of the bones or joints. One, an adult, developed a lesion in the third lumbar vertebra; this was cured by an Albee graft. The other, a child, developed tuberculosis of the hip four and a half years after adenoidectomy. Great improvement was obtained by fixation and traction.

Eighteen of the fifty submitted to tonsillectomy on account of tuberculous cervical glands, and of these a roentgen-ray diagnosis of mediastinal or pulmonary tuberculosis was later made in thirteen; the other five remained clear.

Roentgen-ray studies of the lungs and mediastinum in twenty-two out of the fifty over a postoperative period of five years gave negative findings in ten cases, retrogressive lesions in six and progressive lesions in the remaining six, the latter group presenting no clinical evidence of disease.

The general incidence of tubercular infection of the lymphadenoid tissue was 4.18 per cent., and in tubercular cervical adenitis 48.2 per cent.

The authors conclude that ether anesthesia is the most satisfactory for tonsil work and is not contra-indicated by latent tuberculosis of the adenoid, tonsil or mediastinal glands. Such infection is better not emphasized to the patient.

CONNOR, St. Paul.

THE INDICTMENT OF THE TONSILS. J. H. GETTINGER, Arch. Pediat. **41**:52 (Jan.) 1924.

The author, after reviewing the great attention paid in recent years to foci of infection, enumerates the theories of tonsillar function as given by Sluder in his book on tonsillectomy, and deplores the fact that these possible functions are so often overlooked in what is termed "our ruthless and indiscriminate tonsillectomy."

He quotes from various authors to show that simple hypertrophy is not an indication for operation, that the tonsils ordinarily should not be removed before the age of 15 solely because they are enlarged or contain detritus in the crypts,

that the tendency to bronchial and pulmonary infection is increased by operation, and that acute tonsillitis may serve the very useful purpose of increasing the child's resistance to current infections.

The operation is not the simple procedure that it is often considered to be, but is placed in the category of major surgery by the attendant risks.

TORTUOSITY OF THE INTERNAL CAROTID IN RELATION TO THE PHARYNX. A. BROWN KELLY, J. Laryngol. & Otol. **40**:15 (Jan.) 1925.

The projection of the artery is usually in the posterolateral region of the pharynx. It is bilateral in one-third of the cases. The identity of the artery involved has been questioned; but, compression and palpation show it to be the internal carotid and not the ascending pharyngeal or the vertebral. This view is borne out by the study of anatomic dissections of these anamolies. The author discusses several of the cases reported in the literature and reproduces several sketches.

Some patients show more of a pulsation in the pharynx than actual bulging. From the cases studied it is concluded that tortuosity is more common in females; mostly in children and old people; more often on the right side.

In the embryo, the artery originates from the third aortic arch and the dorsal aorta. At the fifth week, where these portions join there is a decided bend forward and this bend is crossed by the ninth nerve. As the heart recedes into the thorax the artery is straightened out. It is conceivable that if there is greater relative growth of either part of the artery the bend will persist. In support of this view it is pointed out that in these cases: (1) the tortuosity is medial or forward as was the embryonic bend; (2) the tortuosity is crossed by the ninth nerve; (3) the tortuosity is frequently bilateral, suggesting a common cause.

In the young, the prominent pulsating vessels are probably congenital. In the old, high blood pressure and atheroma may be factors; but they did not seem to be prominent features in this series of cases.

The diagnosis is made by observing a bulging in the posterolateral pharyngeal wall, possibly bilateral, pulsating synchronously with the heart, covered by smooth, healthy mucosa, the absence of any symptoms referable to the swelling and the unchanging size over a period of time. It must be distinguished from aneurysm. There are very few accidents reported due to these vessels; but the author advises caution when interfering surgically where there is pulsation around the tonsil.

McNALLY, Montreal.

SURGICAL DIATHERMY TREATMENT OF CHRONIC TONSILLITIS. AGDA HOFVENDAHL, Ztschr. f. Hals-, Nasen- u. Ohrenh. **9**:392 (Dec. 6) 1924.

In cases of hemophilia, anemia, chlorosis, leukemia, tuberculosis, high blood pressure and in nervous persons, a method different from the ordinary surgical tonsillectomy should be considered. Roentgenization (Withers, Witherby) radium and mesothorium (G. Holmgreen 1917, Berven 1919, Withers, Ferrari) and surgical diathermy (Nagelschmidt) have been used. Nagelschmidt coagulates layer after layer, and scrapes the tonsil tissue until it has disappeared. Hofvendahl has used this method in her private clinic for one and one-half years. The results in thirty of her cases were good, the patients mostly had high blood pressure, tuberculosis and were nervous. A weak current was used. The time of operation was from one-half to three-quarters of an hour, on each side, with an intermission of one-half hour. In certain nervous persons, the operation can be done on the second tonsil two days later. A swelling of the uvula occurs, reaching its maximum after five hours, and beginning to decrease after twelve hours. The temperature on the next day is from 37.8 to 38 C. (from 100 to 100.4 F.). Once there was a hemorrhage in a hypernervous person on the tenth day, but so slow that it could be stopped by a

proprietary thromboplastic preparation. Hofvendahl uses the same instruments which are used in the old method of surgical tonsillectomy, and combines the advantages of both methods. She compares the several methods as follows:

1. The ordinary tonsillectomy advantages: (*a*) Short time of operation (about two minutes), (*b*) in most cases complete enucleation of the tonsil. Disadvantages: (*a*) The field of operation is not always to be seen on account of the bleeding, so that remnants of the tonsil may remain; (*b*) there is always a risk of late hemorrhage; (*c*) the position of the pillars is not ideal, because a partial sticking together and later an adhesion of the surfaces of the wound take place.

2. Radium treatment. Advantages: (*a*) Relatively little inconvenience to the patients; (*b*) entirely bloodless procedure. Disadvantages: (*a*) time of treatment too long (from six to twenty-four hours); (*b*) difficulty of limiting the effect of radium on the parts requiring treatment; (*c*) imperfect result; (*d*) the necessary amount of radium scarcely obtainable by the physician in private practice.

3. Surgical diathermy method, Nagelschmidt's method. Advantages: (*a*) comparatively without inconvenience to the patient; (*b*) the effect can always be be limited to the diseased tissue; (*c*) bloodless procedure; (*d*) ideal healing. Disadvantages: (*a*) comparatively long duration of operation (from one and one-half to two hours); (*b*) difficulty of ideal removal of tonsil; one will prefer to leave some tonsil rest to going too deep; the border line is hard to establish. The author's method. It combines the advantages of the methods before mentioned; it saves the patient annoyance; the time of operation is short (about two minutes); it excludes the risk of hemorrhage; healing is ideal and it is entirely successful.

AMBERG, Detroit.

IMPORTANCE OF PHARYNGEAL INFECTION DURING INFANCY. ERNBERG, Acta Pediat. **4**:84 (Oct. 25) 1924.

Ernberg, from a study of hospital and private case records, concludes that acute nasopharyngeal infections are common in infants and constitute the most frequent etiologic factor, not only in acute dyspepsia, cholera infantum and septicemia, but also in acute exacerbations of chronic diseases of this type.

CONNOR, St. Paul.

Larynx

ECCHONDROSIS OF THE LARYNX. RECORDS OF TWO CASES SUCCESSFULLY TREATED BY LARYNGOFISSURE. ST. CLAIR THOMSON, J. Laryngol. & Otol. **40**:1 (Jan.) 1925.

Cartilaginous growths are among the rarest of benign laryngeal tumors. Virchow, fifty years ago, pointed out that these tumors are unsuitable for removal through the mouth. The author regards laryngofissure as eminently suitable.

There is a report of two cases.

CASE 1.—A woman, aged 53, had symptoms for five years. She was seen by the author and the condition was diagnosed as a subglottic new growth of uncertain character, probably innocent. The patient disappeared for eight years. She returned with marked stridor, and a laryngofissure was done. The mucoperichondrium was stripped off the growth and resutured in place. The tracheotomy tube was left in place for three weeks till all swelling in the larynx had subsided. There was no recurrence and the patient died ten years later of other causes. The tumor was definitely cartilaginous and placed under ecchondrosis in the Virchow classification.

CASE 2.—A woman, aged 56, had symptoms for six years. The tumor in the larynx was thought to be of tuberculous origin, owing to the presence of

pulmonary tuberculosis. The patient was seen by the author in consultation. Laryngofissure was done by a general surgeon. The overlying perichondrium was removed with the growth. The patient later suffered from atrophic laryngitis. Nine years later she returned with stridor and dyspnea. A tracheotomy was done without giving relief and the patient died. No necropsy was allowed. Microscopic examination showed the growth to be cartilaginous.

Difficulty in the diagnosis of these tumors is due (1) to their rarity. (2) They are chiefly subglottic. (3) Though pathologically innocent, they may recur and simulate malignant neoplasms.

One case diagnosed as syphilitic was considered by the author as a simple enchondroma and removal was advised. This patient had fixation of the vocal cord, showing that immobility of the cord is not absolutely characteristic of a malignant growth.

Another subglottic tumor was diagnosed as cartilaginous, under cocain the tumor palpated with the probe gave the sensation of a hard, cartilaginous-like growth. It had a uniform ovoid smooth appearance, checked by several visitors to the clinic. The left side of the larynx was immobile. Laryngofissure was done. The growth was thought too soft for an enchondroma, but the cut surface showed the gray, raw potato-like appearance said to be suggestive of cartilaginous tumors. Microscopic examination showed an undoubted epithelioma.

The author points out that neither the solid sensation conveyed by the laryngeal probe nor the raw potato-like appearance on section is characteristic of enchondromas of the larynx.

CARTILAGINOUS TUMORS OF THE LARYNX. (A STUDY OF ALL RECORDED CASES.) IRWIN MOORE, J. Laryngol. & Otol. **40**:9 (Jan.) 1925.

Since cartilaginous neoplasms were first described in 1882 by Heusinger, the author after a most thorough search of the literature could only find sixty-two cases recorded under that title.

Heusinger described these neoplasms as chondroides, but there were various kinds of growths grouped under this heading even to carcinomas. Muller, in 1836, first defined these growths from their histologic aspect. He used the term chondromas or enchondromas for the whole group. Virchow, in 1863, adopted the term chondromas as representing the entire group and made two subdivisions: (1) Ecchondroses or ecchondromas: he limited this to true cartilaginous structures: hyperplastic: not invading the original tissue; arising from already existing or primitive cartilage; (2) Enchondromas: tumors not produced from existing cartilage. Alexander, in 1900, accepted the term ecchondromas as defined by Virchow, and he added four other groups: (1) Chondromas, i. e., true neoplasms which invade the mother substance from which they originate: for the most part malignant; (2) mixed tumors, neoplasms consisting of different tissues, e. g., chondrosarcomas; (3) tumors of general hypertrophic or hyperplastic character affecting one or all of the cartilages of the larynx; (4) inflammatory neoplasms.

Moore considers that Virchow's classification remains to the present time the most satisfactory. A more recent classification by Irwin Moore based on Alexander's suggestion is published under the heading "Site of the Tumors."

There is a complete review of all the cases reported since 1837. New, in 1918, collected forty-seven cases in all. In the present survey Moore collected sixty-two cases: thirty-nine were microscopically proved true tumors; five were macroscopically diagnosed (four at necropsy, one after removal); nine were diagnosed on strong clinical evidence; in nine other cases the evidence was insufficient, so that excluding the last nine cases there is a total of fifty-three true cartilaginous tumors of the larynx recorded up to the present date.

MCNALLY, Montreal.

EXPERIMENTAL CONTRIBUTIONS CONCERNING THE RESPIRATORY MOVEMENTS OF THE LARYNX OF THE DOG. WALTHER STUPKA, Ztschr. f. Hals-, Nasen- u. Ohrenh. 9:306 (Dec. 6) 1924.

The question of the existence of auxiliary abductors in the larynx are of eminently practical interest. Formerly the view was generally accepted that the most important vital function, the opening of the glottis, was taken care of by the crico-arytenoid muscles, posteriorly. Contrary to this view A. Kuttner and J. Katzenstein, in 1899, experimentally developed the doctrine of the existence of auxiliary abductors. Stupka's investigations refer to this very important problem. Besides this consideration, Stupka was interested in the question whether, under all circumstances, the adductors are also innervated beside the posterior crico-arytenoid muscles, which are continually innervated during respiration, and, also, whether certain outer muscles of the larynx take part in the respiratory phases. Stupka comes to the following conclusions:

1. The cinematographic method furnishes excellent means for the study of the phenomena of motion, asymmetries and oblique positions of the larynx. It is superior to any other method of measuring used so far.

2. The endolaryngeal and endopharyngeal electric examination of the larynx, in its improved manner, and with the exact knowledge of the elective points of muscle irritation and nerve irritation, and with consideration of the minimal contraction values afford the same reliable information concerning the functional condition of the larynx as the electrophysiologic examination of any other group of muscles.

With the aid of the inner electric examination, the nerve supply of the larynx, certain losses of the same, processes of degeneration and regeneration, the success or failure of surgical disconnection experiments concerning single muscles or groups of muscles, and especially, individual conditions of the nerve supply, or muscular effort can be recognized. This can be done much more perfectly and completely than by the electric examination from the wound (necropsy in vivo), because in the latter instance, the natural position of the larynx and of its surroundings are disturbed. The inner electric examination, alone or with cinematography permits an exact analysis of the clinical symptoms under observation. Only periodically repeated inner electric examinations make it possible, to judge changes of the larynx and to draw diagnostic conclusions correctly. The method can be comfortably employed on the animal in semideep or superficial narcosis. It is technically simple, and with some practice extremely reliable as to its results. The endolaryngeal and endopharyngeal electric examination make it unnecessary to reopen the wound for the purpose of electric examination, and this can be done as frequently as one pleases and is therefore preferable to incomplete examination of the wound. Beside this, the condition of the wound comes into consideration.

3. Inspiratory abductions of the vocal cords are still possible even after complete disconnection of the musculus posticus. They are, however, limited as to the extension of excursion. They reach laterally only to the position in the cadaver. They can, without exception, only be understood as the failing of the innervation of the adductors during expiration. When a trespassing beyond the cadaver position was found, there always were unsuccessful, respectively, incomplete, experiments in regard to disconnection. The crico-arytenoid muscle posterior must be considered to be the only abductor of the vocal cords, because disconnection of the adductors and tensors, of the outer muscle system of the larynx and pharynx remain without influence on the degree of abduction of the vocal cord.

4. After complete disconnection of the adductors and tensors, there are still expiratory adductions of the vocal cords. They are, however, limited as to their excursions, and they reach medially only to the cadaver position. They prove to be nothing else but the abatement of the innervation

of the posticus, which is active during inspiration. Thus they are a pendant of the inspiratory abduction movement of the vocal cords when the posticus is paralyzed.

5. Special attention must be paid to the preparation of the animal and to the depth of the narcosis when studying the respiratory movements of the larynx in normal and pathologic conditions. Neglect of attention to the conditions of the narcosis might explain the differing results of various investigators in interferences, which can otherwise be made the subjects of comparison.

6. With increasing depths of narcosis, the innervation of the adductors and tensors decreases, especially that of the former. Superficial narcosis must be used in order that one may be able to judge about the effects of the muscles which belong to the category of the adductors and tensors.

7. The deeper respiratory movements of the thorax and diaphragm, which occur with increasing depth of the narcosis, are rhythmically connected with the increased abductory movements of the vocal cords. The experiments concerning disconnection teach that the increased abduction of the vocal cords does not only depend on the decrease of the tonus of the adductors and tensors, but also on an increase of the degree of innervation of the posterior crico-arytenoid muscle (probably an increase in the number of the activated fibers). The posterior crico-arytenoid muscle is the muscle of inspiration par excellence.

8. Besides the adductors, cricothyroid muscle, at least in the animal, is the typical muscle of expiration (H. Krause). Its decrease in contraction during inspiration favors the opening of the glottis by approximation of the insertions of the vocal cords.

9. The tracheal pull is a function of all active muscles of the trunk. It is not eliminated by paralysis of the diaphragm. The degree of abduction of the vocal cords is not dependent on the presence of the tracheal pull.

10. Oblique positions of the sagittal axis of the larynx are always caused by unilateral overbalance of active forces. Tetanic irritation of the recurrence points in the hypopharynx causes the sagittal axis of the larynx to deviate to the irritated side. Contraction of one cricothyroid muscle causes deviation of the sagittal axis of the larynx backward to the opposite side (Neumayer). Isolated contraction of the posticus seems to cause slight deviation of the sagittal axis of the larynx to the active side.

AMBERG, Detroit.

Nose

ATROPHIC RHINITIS AND OZENA-HALLE OPERATION. A. J. LORIE and PAUL LUX, Ann. Otol., Rhinol. & Laryngol. **33**:1263, 1924.

Excellent results are reported by the authors from the use of the Halle operation in ozena. The principle involved is the narrowing of the nasal passage by an infraction inward of the lateral nasal wall, making contact with the septum. Under local anesthesia, the mucous membrane on corresponding areas of the septum and inferior turbinate are freshened by gentle scraping. A vertical incision through the mucous membrane of the lateral nasal wall in front of the inferior and middle turbinates and extending across the floor is made down through the mucoperiosteum, and the mucoperiosteum elevated throughout the length of the incision. The antrum is opened along this line, and the entire lateral nasal wall mobilized and forced inward until in contact with the septum. The antrum is then packed with iodoform gauze to hold the parts together. The packing is removed in five days and the cavity repacked if necessary. The postoperative treatment consists in cleaning and repacking the antrum until the adhesions are firm and the antrum has closed with granulations. This usually takes from five to six weeks.

AN UNUSUAL SYMPTOM OF MAXILLARY SINUS DISEASE. GEORGE J. DENNIS, Ann. Otol., Rhinol. & Laryngol. **33**:1356, 1924.

Numerous clinical observations and experiments are reported by the author, which appear to prove that irritation of the maxillary sinus may result in much the same phenomena as an irritation of the nasal mucous membrane. Attention was first called to this subject by the fact that, in a patient with a severe cough, the symptoms immediately subsided completely on irrigation of an infected maxillary antrum. Following this, several other cases were observed with the same results. It was interesting to note that the rapid diminution of the cough after the first removal of pus was without any relation to the continuation of the secretion. Results of animal experimentation as done by other investigators are reported by Dennis, in which various substances, such as air and alcohol, were injected into the antrum. Some of these experiments seem to have supplied a physiologic basis for nasal asthma. The impressions produced by a study of these conditions were that they must be of a reflex character. Conceivably, they might be of toxic origin, yet the rapid subsidence of the symptoms after the removal of the contents of the sinus seemed to proclaim the reflex rather than the toxic nature of the symptoms.

SNAPP, Grand Rapids, Mich.

LATENT POSTERIOR SINUSITIS AND LESIONS OF THE OPTIC NERVE. SARGNON, J. de méd. de Lyons (May) 1924.

Latent inflammatory lesions of the posterior sinuses more often cause complications of the optic nerve than the true suppurative processes, in the form of retrobulbar optic neuritis, or more rarely papillitis with or without hemorrhages.

These complications are explained by the anatomic association of the optic nerve with the posterior ethmoidal cells and the sphenoidal sinus.

Of the patients observed by the author, and treated for the most part by endonasal surgery, there were four cases of bilateral and five cases of unilateral complications with seven good results of the nine. Retrobulbar optic neuritis is often caused by contiguous infectious lesions to the extent of 30 per cent. of such cases. Compared with other causes, enlarged turbinals, deviation of the septum and causes which hinder drainage from the ethmosphenoidal cells play an important rôle.

The ocular signs in retrobulbar optic neuritis are characterized by peripheral or central scotomas and periocular pain.

The nasal signs are vague and difficult to determine but are the slight signs which characterize congestion and inflammation of the posterior nasal region.

The prognosis varies, as some cases terminate favorably without surgical intervention, while in other cases patients are operated on with success.

The treatment consists in draining the ethmosphenoidal spaces with resection, partial or complete, of the middle turbinal.

ROBERTSON, Chicago.

INVESTIGATION OF VARIOUS METHODS OF TOPICAL APPLICATION OF COCAIN. HELMUT LOEBELL, Ztschr. f. Hals-, Nasen- u. Ohrenh. **10**:1 (Nov. 8) 1924.

Fifty specimens of human turbinates, removed by operation, to which cocain had been applied by various methods: (1) spraying; (2) by rubbing in; (3) by tamponing, were examined. Except such changes as were due to the original pathologic condition, there was no difference as to blood vessels, cavernous tissue, cell infiltration or glands, aside from the intact surface epithelium in the patients who were sprayed.

In frogs, examinations were made with reference to ischemia production. All methods produced the same result except that it was delayed five minutes by rubbing, hyperemia occurring in the interval, which results in carrying off some of the cocain, and presumably increasing the risk of toxemia by absorption.

Loebell has concluded that the spray method is at least the equal in practice of any other method.

In the discussion which followed, Marschik said he thought that spraying cocain is not safe, as an unknown quantity may be swallowed. He prefers tampons to accessible nerve regions.

Jansen said that he does practically all ear, nose and throat operations under local anesthesia.

Von Eicken said he denied that there was greater toxicity from careful painting, and claims more rapid anesthesia.

THE SIMPLEST AND BEST BLOCK ANESTHESIA IN RADICAL MAXILLARY ANTRUM OPERATION. BIRKHOLZ, Ztschr. f. Hals-, Nasen- u. Ohrenh. **10**:16 (Nov. 8) 1924.

Ordinary infiltration anesthesia is unsatisfactory, especially the lack of ischemia. Block anesthesia of the second branch of the fifth nerve is preferable. Birkholz uses a modification of the Payr method. It is without danger; gives satisfactory anesthesia in the maxillary and posterior ethmoid regions, lasting from one to two hours; ischemia is certain; technic is simple.

The needle is inserted over the middle of the zygoma, horizontally inward and slightly downward, at an angle of 45 degrees to the sagittal plane. At 4 to 4.5 cm. in depth, the edge of the sphenopalatine fossa is reached, and the fossa is entered a little anterior to this edge. Two cubic centimeters of 2 per cent. procain is injected. Several further injections downward and forward are made to cause contraction of the branches of the internal maxillary artery.

In all injections a glass syringe should be used, to show blood if a vessel is entered.

Indications: Radical antrum operation, especially if bilateral; permaxillary operations on ethmoids; Denker's operation for maxillary tumor; cysts.

It is necessary, in addition, to use intranasal tampons for the nasal nerve, and in unilateral operations gingival injection toward the opposite side.

(We have found intranasal cocainization of the sphenopalatine ganglion, plus intranasal tamponing and infiltration of the facial surface satisfactory for the Caldwell-Luc operation.)

LEWY, Chicago.

Miscellaneous

FOREIGN BODIES IN THE AIR AND FOOD PASSAGES OF INFANTS AND CHILDREN. RUSSELL S. ROWLAND, Am. J. Dis. Child. **28**:183 (Aug.) 1924.

The author, in a discussion of foreign bodies in the air and food passages of infants and children, emphasizes the great importance of the clinical diagnosis made from the history, symptoms and physical findings, in addition to the roentgen-ray study and endoscopy. For convenience and study of foreign bodies, four groups are considered:

1. Patients with a clear history of having aspirated a foreign body and showing typical signs and symptoms; the most frequent type.

2. Patients suggesting the possibility of foreign body, in which no history can be obtained; of not infrequent occurrence.

3. Patients with no history and with slight signs and symptoms, in whom the foreign body is accidentally discovered during the routine examination.

4. Cases of obscure pulmonary involvement which, with a better knowledge and a more careful consideration of the history, signs and symptoms, might be correctly recognized as foreign body cases.

Foreign bodies arrested in the pharynx, larynx or trachea give a definite history and produce marked symptoms. Such bodies are usually movable and their movements can often be felt by the patient. The cough may be continuous and violent. The sudden shutting off of inspiration and phonation during cough is quite characteristic, and an audible slap, a palpable thud and an asthmatoid wheeze help complete the picture. In the case of foreign bodies in the esophagus, there is often no history and usually no diagnostic symptoms present. There may be regurgitation or various degrees of difficulty in swallowing.

Of most interest to the pediatrician from a diagnostic point of view are patients with foreign bodies in the bronchi and lungs, especially of the nonradio-opaque type. These patients often present great difficulty in physical diagnosis, and the author refers to Chevalier Jackson's recent article: "The Mechanism of Physical Signs, with Special Reference to Foreign Bodies in the Bronchi" (*Am. J. M. Sc.* **165**:313) in which three points are particularly mentioned as complicating the physical diagnosis. The bronchial movements, the presence, absence or shifting of secretions, and the presence and movement of the foreign body itself may make the diagnosis difficult.

Three important diagnostic points brought out by MacCrae (*Am. J. M. Sc.* **159**:313) are first, decreased expansion of the affected side; second, tissue paper râles localized in the region of the foreign body, and third, the asthmatoid wheeze, heard only before the open mouth.

Foreign bodies, nonradio-opaque, frequently present difficult diagnostic problems. In a well marked case, roentgen-ray findings consist of greater transparency on the obstructed side, displacement of the mediastinal contents toward the free side, and depression and limitation of the diaphragmatic movement on the obstructed side.

It is well to remember that a foreign body may be present over a considerable period of time and give all the physical signs and symptoms of tuberculosis, and that in such cases radiographic studies and, if necessary, bronchoscopy, should be made in order to eliminate the possibility of foreign body. Jackson (The Symptomatology and Diagnosis of Foreign Bodies in the Air and Food Passage, *Am. J. M. Sc.* **161**:606) and others emphasize the following physical signs of foreign bodies in the bronchi: (1) Limited expansion; (2) decreased vocal fremitus; (3) impaired percussion note; (4) diminished intensity of breath sound distal to the foreign body; (5) absence of vocal fremitus over a "drowned lung"; (6) varying grades of tympany over areas of compensatory emphysema, and (7) râles over the unaffected side.

NEW METHOD FOR MAKING ESOPHAGEAL STRICTURES VISIBLE AND PHOTOGRAPHING THEM, PARTICULARLY IN THE CASE OF CHILDREN. ARTHUR POLLERMAN, Am. J. Dis. Child. **28**:549 (Nov.) 1924.

The author mentions the difficulty experienced in getting very young children to swallow the usual bismuth or barium compounds, and describes a method of demonstrating esophageal strictures, which consists essentially in passing a thin-walled rubber tube, impregnated with as much lead as the rubber can carry without losing its elasticity, over a well-oiled bougie. The bougie is then withdrawn and the tube inflated. Expansion causes the walls of the tube to conform closely to the walls of the esophagus and the contact demonstrates in the roentgen-ray plate any stricture or other deformity which may be present.

CONNOR, St. Paul.

ROENTGENOGRAPHY OF OPTIC FORAMEN IN TUMORS AND DISEASES OF THE OPTIC NERVE. J. VAN DER HOEVE, Am. J. Ophth. **8**:101-112 (Feb.) 1925.

Van der Hoeve reports two cases of tumor of the optic nerve. The first is one of neurofibromatosis of the nerve, in a woman, aged 37. The right eye was totally blind, the left eye showed marked visual diminution with a restricted field. The disks were atrophic without sharp limits. In the blind eye small retinal tumors, such as are seen in Recklinghausen's disease, were found. The author felt that the blindness in this case might be due to neurofibromatosis of the optic nerves and had roentgenograms of the optic foramina made. These showed a considerable enlargement of both optic foramina.

Eight months later Professor Laeger, Director of the Leiden Surgical Clinic, operated by the frontal bone flap exposure and exposed the left optic foramen. No circumscribed tumor was found, but the optic nerve was about three times its normal thickness and was compressed in the canal.

The second patient was a woman, aged 39, with an orbital endothelioma of the optic nerve without any extension into the optic canal. Roentgenograms of the optic foramen in this patient showed the foramen to be of normal size.

The author states that roentgenograms of the optic foramina may be used:

1. To see whether fractures, fissures or callous conditions are present in the bony surroundings of the foramina and whether abnormal shadows give indication of the presence of tumors.

2. For the examination of the size and form of the foramina.

Rhese's technic of roentgenographing ethmoids is used by the author. The author emphasizes the importance of a standard uniform technic in all cases, and cooperation between the surgeon and the roentgenologist.

According to the author's experience, variations in the normal optic foramina are not very great. Variations are within narrow physiologic limits. Leon E. White, in an interesting article on roentgenography of the optic canal, using a technic which is only a slight modification of Rhese's original method, found the size of the optic foramina to vary from 3.5 to 6.5 mm. The average being 5.5 mm. The author's anatomic study has shown the optic canals to vary in diameter from 4 to 6.5 mm. Goalwin found the canal not strictly circular, but that the quadrants averaged from 4.26 to 4.5 mm.

The author insists on extreme care in judging the roentgenograms, even under the best conditions. An excessively large foramen in suspected tumors of the optic nerve makes it highly probable that the new growth involves the optic canal. A normal foramen, on the contrary, does not prove that a tumor of the optic nerve has not involved the optic canal. An excessively small or too much deformed foramen can, in atrophy of the optic nerve, retrobulbar neuritis, etc., be expected to give a predisposition to optic nerve disease.

White, in his roentgen-ray examination of the optic foramen, observed that a retrobulbar optic neuritis is more dangerous in patients with narrow than in those with wide optic canals, and he felt that a canal of 4 mm. or less in a case of severe optic nerve involvement indicated the necessity for immediate operation on the sinuses. The 4.5 mm. canal gave greater leeway and in a 5 mm. canal, recovery would probably be spontaneous or after local treatment.

The author feels that this is of only relative value, because as there are physiologic variations in the width of the canal, there are also these same variations in the size of the optic nerve, but he feels White is right in saying that a narrower canal must be a handicap for an optic nerve in case of swelling. The author feels it is better to be led in our treatment by the severity of the inflammation and its consequences rather than by the size of the optic foramen, so long as this remains within the physiologic limits.

A bibliography is appended.

H. H. VAIL, Cincinnati.

CICATRICIAL STENOSIS OF THE ESOPHAGUS. GABRIEL TUCKER, Ann. Otol., Rhinol. & Laryngol. **33**:1180 (Dec.) 1924.

The dangers attending the blind pushing downward of peroral bougies in cases of esophageal stricture are strongly emphasized by the author, who reports a series of twenty-five stricture cases, together with an outline of the methods used. In addition to the dangers of the bougie, it is inefficacious and unnecessary since the development of esophagoscopy. Fluoroscopic studies, however, should precede the passing of the esophagoscope, as many lesions may be excluded in this way. Esophagoscopic bouginage will facilitate determination of different stricture levels but should be used with extreme caution. It is relatively safe in careful hands, but its results are obtained slowly, and multiple eccentric strictures must be dealt with carefully and one at a time. Rapid instrumental dilatation in these cases is extremely dangerous.

The method used so successfully by the author is that of retrograde bouginage, and consists first in performing a gastrostomy. The giving of all food by mouth being stopped, the esophagus is relieved from the static esophagitis which is so often a factor in increasing the amount of cicatricial tissue, the subsequent contraction of which renders the stricture more and more difficult to cure. This freeing of the esophagus from irritation also facilitates the swallowing of a string which is the second step. After passing well into the stomach, the string is caught through the gastrostomy wound with a small blunt hook and brought out. It is then replaced by a heavier twisted silk string which, when once in place, is used to pull the bougies upward from below starting with the smallest size, No. 10. When attaching the bougie to the string a new string is also attached so that a fresh string may replace the old one at each sitting. After the treatment the two free ends of the string are tied together, making it continuous. At the next treatment it is cut half way between the mouth and abdominal fistula, the bougie tied on and the procedure repeated.

The bougie devised by Tucker is made of the best quality of rubber, moulded on an endless braided silk thread with a free loop at either end.

The procedure is relatively free from the dangers associated with other methods, is done without anesthesia, and hospitalization is not required for the bouginage.

SNAPP, Grand Rapids, Mich.

RETROBULBAR OPTIC NEURITIS, WITH SPECIAL REFERENCE TO BACILLUS SUBTILIS INFECTIONS. J. SHELDON CLARK, Illinois M. J. **46**:339-342 (Nov.) 1924.

The author reports a case of a woman, aged 42, who, a week or so after an acute cold in the head, showed almost sudden loss of vision in the left eye and somewhat reduced vision in the right eye. The ophthalmoscopic examination showed papilledema of the left eye, amounting to three diopters, with distended veins and a few minute streaks of hemorrhage in the smaller retinal arteries close to the temporal border of the disk. The temporal half of the disk had the characteristic and well-known pallor. In the right eye there was only a suggestion of involvement. Within forty-eight hours the patient found herself blind in both eyes, with light perception only remaining.

The usual treatment of pilocarpin sweats, mercury rubs on the temples, ethmoid drainage as well as spinal drainage was advised. Roentgenograms of the head were negative. Blood serum was negative as to Wassermann test. Colloidal gold test was negative and negative as to tubercle bacilli. The spinal fluid was Wassermann negative, with a cell count of 100. Globulin was negative. A gram-positive bacillus was present which was identified as *Bacillus subtilis*. The urine was negative. Repeated specimens of the spinal fluid were sent to two laboratories and both reported the finding of *Bacillus subtilis*.

It was then learned that the patient had been handling a shipment of nursery stock which had been packed in straw, and that this work preceded her first attack of rhinitis by but a few days.

The treatment given was that of pilocarpin hydrochlorate sweats every other day and on alternate days, and a spinal puncture was done three times with from 10 to 20 c.c. of fluid withdrawn each time. The fluid was clear and under no noticeable pressure. Cyanid of mercury injections were given well back on the eyeball. Strichnin nitrate was administered hypodermically in gradually increasing dosage. Although intranasal operation had been suggested, none was performed. Two days after the institution of the treatment the patient was able to distinguish large objects in the room, and some improvement in light perception occurred in the left eye. Improvement of vision continued with perfect return so that with correction she ultimately showed 20/20.

The author further states that in looking up the literature of the last three or four years, he came across but one instance of *Bacillus subtilis* infection, which had to do in any way with the eye or the orbital structures. This was an article by Paul J. Steuber, entitled: "Intra-Ocular Infection with an Organism of the Bacillus Subtilis Type," and reported in the *Ohio State Medical Journal*, March, 1921.

Clark, in his paper, mentions Langenbeck's studies of 176 cases of retrobulbar neuritis and according to Langenbeck, sinus disease came fifth as a causal factor.

The author's conclusions are that while transillumination as well as roentgenography should be made use of early in cases of retrobulbar optic neuritis, yet a negative report of either or both should not deter one in early operation on infected or closed sinuses.

Diagnosis should be made early. Fields should be taken in doubtful cases. As a subjective aid, taken with the other signs and symptoms, one constant diagnostic point is that patients complain of retrobulbar pain on moving the eyes. It is therefore by a process of exclusion that we are to arrive at a diagnosis of retrobulbar optic neuritis. As rhinologists and oculists, we must ever have in mind the possibility of an ethmoidosphenoiditis as the causal factor.

Bacillus subtilis has been considered nonpathogenic. The author states that his observations in the case he reports seemed to coincide with those of other observers and tend to prove that such is not the case, especially as regards retrobulbar optic neuritis.

The low virulence of the organism may in part account for the fact that a good recovery was obtained in the case he reports, despite the fact that treatment was delayed and the possible good which might have been had from a postnasal operation. The author believes that the patient received benefit from the spinal drainage, and through the examination of the fluid the organism was recovered that in his opinion caused the neuritis.

H. H. Vail, Cincinnati.

Comparative Study of Ethmoidal and Sphenoidal Surgery with Reference to Eye Complications. Slade A. Smith, South. M. & S. **86**:433-434, (Oct.) 1924.

Smith feels that the most important group of ocular complications of nasal sinus disease is that in which there is nasal sinusitis without external sign of orbital inflammation, but in which there are optic neuritis, neuroretinitis, retinal thrombosis or cases in which there is a central scotoma without marked ophthalmoscopic changes. Successful surgery in these patients must be based on the thoroughness of the exenteration of the sphenoid sinus and posterior ethmoid cells. The author gives his technic of operation.

A Case of Optic Neuritis. George Thomson, M. J. Australia **2**:563 (Nov. 22) 1924.

At a meeting of the Eye, Ear, Nose and Throat Section of the Queensland Branch of the British Medical Association, Sept. 19, 1924, George Thomson showed a girl, aged 12 years, who had been seen in August, 1923. At that time she had complained of headache and vomiting. The left eye had been normal and the right disk was a little "fuzzy." The sight in both eyes had been good.

In May, 1924, Dr. Thomson saw the patient. At that time optic atrophy of the left eye was present and the eye was blind. Optic neuritis had been present in the right eye and vision had been 6/9 (partial). Lumbar puncture showed clear fluid with normal pressure. Blood Wassermann was negative and no abnormality had been found on roentgen-ray examination. Examination of the nose showed a deviated and obstructive septum. Adenoids were present and the tonsils were slightly enlarged. Urine was normal.

Operation on the tonsils and adenoids was followed by a subsidence of the right papilledema with improvement of vision up to 6/6. No changes occurred in the left eye.

A Case of Retrobulbar Neuritis Possibly Resulting from Pyorrhea. W. W. Hoare, M. J. Australia **2**:562 (Nov. 22) 1924.

Hoare, at a meeting of the Eye, Ear, Nose and Throat Section of the Queensland Branch of the British Medical Association, Sept. 19, 1924, showed a man, aged 54, with a complaint of failing vision. The right vision had been 6/24 and the vision in the left eye had been 6/24. Nothing abnormal had been found in either fundus. The fields of vision had been normal, the urine normal. Roentgen-ray examination was negative. There was no central color scotoma and the Wassermann test was negative. A tentative diagnosis of toxic amblyopia due to tobacco and alcohol had been made.

After several weeks the vision was reduced to 6/60 in the right eye and 6/36 in the left. It was noticed that the patient was afflicted with foul pyorrhea. Several teeth were extracted and the rest treated. Almost immediately the vision had improved. At the time patient was shown the vision in the right eye was 6/12 and in the left eye 6/9. This improvement had taken place, notwithstanding the continuation of the tobacco and alcohol. Dr. Hoare showed that there was definite pallor of both optic disks on the temporal side, and he felt the patient was possibly suffering from retrobulbar optic neuritis due to pyorrhea.

Adenoids and Retrobulbar Optic Neuritis. Leale, Policlinico **31**:1300-1301 (Oct. 6) 1924.

Leale reports a case of a boy, aged 12 years, with retrobulbar optic neuritis following a cold. Eye examination showed a bilateral retrobulbar optic neuritis, worse on the right side, with central scotoma and hyperemia of the papilla.

Nasal examination showed adenoids, which caused obstruction to breathing. Frontal and maxillary sinuses transilluminated normally. No pus was found in the nose and the nasal fossae seemed normal. The Wassermann and urine examinations were negative. Adenoids were removed, and the outcome following operation showed the importance of the inflammatory process in the adenoids in this patient.

H. H. Vail, Cincinnati.

The Fahreus Blood Sedimentation Test in Otolaryngology. Bertog, Ztschr. f. Hals-, Nasen- u. Ohrenh. **10**:28 (Nov. 8) 1924.

The author believes that this test has value in determining the presence of an infective (pus) inflammatory lesion, and as an aid to clinical observation,

when used repeatedly, in judging the progress of an infection. The technic is as follows: In a syringe containing 0.4 c.c. of a 2.5 per cent. sodium citrate solution is drawn by venipuncture enough blood to make 2 c.c. After mixing the citrated blood in a centrifuge tube it is drawn up into a 1 c.c. pipet of 3 mm. diameter. The settling of the red cells progresses normally (also in chronic suppurations) at the rate of 2 to 12 mm. an hour. In acute suppurative processes at the rate of 15 to 75 mm. an hour. The ensuing discussion disclosed a difference of opinion as to the reliability of the test as an index of the severity and progress of the infection, and also that a positive finding, namely, marked increase in the rapidity of the sedimentation, occurs in other conditions, notably carcinoma and advanced tuberculosis. One observer stated that injection of epinephrin hastened the sedimentation.

BIOLOGIC EFFECT OF ISO-OCTYLHYDROCUPREINE. BIRKHOLZ, Ztschr. f. Hals-, Nasen- u. Ohrenh. **10**:242 (Nov. 8) 1924.

The author finds that iso-octylhydrocupreine (vucin) acts as an irritant in the spinal canal, causing increased exudate with diapedesis of red and white cells.

TREATMENT OF MENINGITIS WITH VUCIN. NUEHSBAUM, Ztschr. f. Hals-, Nasen- u. Ohrenh. **10**:244 (Nov. 8) 1924.

Twenty-one patients were treated, of which sixteen were definitely diagnosed by means of spinal puncture. Nine patients gave positive culture of the spinal fluid. One of these was meningococcic. Of the sixteen patients two recovered (it is not stated if they were among the nine who had positive cultures). In ten the injections caused adhesions of the dural sac. One patient had softening of the caudal cord itself. The two patients who recovered, showed improvement only after the iso-octylhydrocupreine had been discontinued because dural adhesions made further injections impossible.

The best results in meningitis were obtained by complete exenteration of the primary focus and complete and repeated spinal drainage. Three patients with fistula drainage with large outflow made the best recoveries.

Knick reports in detail patients with injury from iso-octylhydrocupreine injection, and in the ensuing discussion Linck, who was one of the first to report a series of meningitic patients who recovered after iso-octylhydrocupreine injections, stated that he regretted that another of our hopes in the conquest of our worst enemy, meningitis, had failed.

(Last year results were reported of eight patients treated with iso-octylhydrocupreine. No recoveries were obtained in our series in the patients with positive cultures of the spinal fluid. Without details of spinal fluid cultures, reports of cases of meningitis are of little value in determining the value of any method of treatment.—A. L.)

THE TREATMENT OF SALIVARY FISTULAE. HENKE, Ztschr. f. Hals-, Nasen-u. Ohrenh. **10**:373 (Nov. 8) 1924.

On account of the great technical difficulty of surgical treatment of this distressing condition, the author undertook roentgen-ray treatment. One case of salivary and two of postoperative parotid fistulas were treated with success. One of the parotid patients had been repeatedly treated surgically without result. Temporary healing was obtained in two congenital branchial fistulas.

The dose is described as from one-quarter to one Holzknecht erythema dose, on one field (symmetry apparatus, using a 3 mm. aluminum filter, 23 cm. distance tube, medium hard). The author quotes Manfred Fraenkel, Kleinschmidt, Kaesz and Schadel with a total of eleven patients who were cured.

LEWY, Chicago.

DIFFERENTIAL DIAGNOSTIC CONSIDERATIONS OF RETROBULBAR NEURITIS. HEINRICH HERZOG, Wien. klin. Wchnschr. **37**:972-974 (Sept. 25) 1924.

The author considers multiple sclerosis, nasal disease, syphilis, tobacco, pregnancy, lactation, trauma and menstruation as possible causes of optic nerve lesions. Usually the diagnosis lies between multiple sclerosis and nasal disease, as the remaining factors can be eliminated at once.

Neurologic examination may show symptoms which must come from multiple sclerosis, that is, paresis, sensory reflex changes, etc., as well as the optic damage. Therefore the optic damage must be explained by the multiple sclerosis which is frequently connected with disease of the optic nerve. The author insists that in such cases the nasal cause must be thoroughly weighed, as, based on his experience, the optic nerve disease is frequently the first, and for a long time the only symptom of multiple sclerosis (one third of the cases). It begins, as Marburg shows, with optic nerve disease. The patients in whom the optic damage (enlargement of the blind spot, central scotoma, more or less reduction of visual acuity) is demonstrable, are, as a rule, in the first place brought to the rhinologist. His examination should give the answer as to whether there are changes in the nasal interior which can be held responsible for the disease of the optic nerve.

Extensive researches have shown the great importance of the nasal accessory sinuses as causal factors. The before-mentioned conditions result from the mutual relation between the optic canal and the nasal sinuses. The joining link between both is formed by the loose, meshy tissue of the medullary spaces, which occasionally are so extensive that the appearance similar to spongy bone is found which allows open communication on both sides.

In summing up the findings it is a question, apart from the rare cases of malignant new growths, of excessive expansion of particular cavities (mucocele), but for the most part by the establishment of an infectious process in the cells.

More difficult are those cases of slight disturbance where the mucosa has become swollen, hyperplastic and polypoid without free pus present. Notwithstanding, the spaces and the bones can be quite diseased. This especially holds true for the ethmoids. The reasons for this lie in the anatomic relations. Between the mucosa and the medullary spaces there is a connection, so that the deep layers of the mucosa pass without interruption to the tissues of the medullary spaces. It is to be understood that inflammation by progression from the depths arrives soon at the spaces.

Lastly, a particular point of view is to consider the question of more acute inflammations. At the height of the process, the mucosa is intensely reddened, swollen, velvet-like or glassy. An excellent insight as to how intense the tissues in the depths of the sinuses can be diseased is given us by section through the head of the middle turbinate, which we occasionally must remove in acute frontal sinus and anterior ethmoid disease. Small cell infiltration of the mucosa and submucosa, excessive filling of the vessels, high grade edema of the medullary spaces and now and then bone destruction are found.

Should such a process take place in the posterior cell system near the region of the optic canal, the dural sheaths must come occasionally under the influence of the inflammation. The loose, meshy tissue allows the most favorable conditions for the spreading of the inflammatory edema. That the resistance of the dura now and then can be broken, and thereby the leptomeninges and the nearby nerve fibers damaged, can hardly be questioned. The spread and the virulence of the inflammatory process result from the intensity of the infection, and from the degree of the sponginess of the bones.

On these conceptions, the optic nerve injury is considered a local circumscribed serous meningitis, which in most cases results from the diseased accessory nasal sinuses through the channels of the medullary spaces. All these serious results of inflammations may be concealed under a covering very

slightly changed or even approximately normal in appearance. The establishment of these facts is certain. Their knowledge is essential. They show how closely a macroscopic study of the interior of the nose is required in passing judgment on the inflammatory process, and how easily we can make an error. This will be avoided when we complete the macroscopic findings by microscopy. This material we gain through the wide opening of the ethmoid region which, in such cases, is not only allowed but is demanded.

The uncovering of a diseased focus in the nose allows, first of all, no conclusions as to the etiology of the visual disturbance. The author feels that the rhinologic genesis of retrobulbar neuritis is comparatively rare. Statistics are absent in the literature, but hardly more than 10 per cent., he feels, is allowed of all cases. Herein consists a radical difference between multiple sclerosis. This is emphasized with all stress.

The author states that chronic accessory sinus diseases are extraordinarily abundant and yet more so is acute rhinitis, also in its intensive form; everybody has it at some time during life. A coexisting disease of the optic nerve is the exception. His experiences are supported, he states, by a wide and careful study of nasal accessory sinus material over a period of many years. His figures stand in sharp contrast to those of Markheiter, who found visual field changes in 70 per cent. and Wallis Edin in 90 per cent. of all empyema cases. De Kleinjn and Van der Hoeve found no case of inflammation of the posterior sinuses without enlargement of the blind spot. For the etiologic significance, therefore, the proof of a nasal diseased focus is fundamentally different in valuing—as in multiple sclerosis. On the other hand, we find ourselves in a favorable situation through the possibility of influencing the nasal disease therapeutically, after removing the focus and drawing retroactive conclusions as the result of the outcome.

The consideration of conservative or radical methods of therapy depends on the kind and seat of the process. Only a word is necessary as to the therapeutic significance of anesthesia, i. e., anemia (cocain-epinephrin). Its effect is not always appreciated enough. When we consider the clinical picture in acute anterior sinus disease with terrible headaches, swollen eyelids and pain on pressure, edema, swelling and redness of the nose, and how this entire symptom complex can vanish as a rule, through abundant use of cocain and of epinephrin, it is very possible to feel that it may produce a favorable outcome by itself, though it is hardly to be considered as a settled intervention; this use of cocain and epinephrin is present in every exploration of the nasal interior.

With the removal of the primary focus, there is a subsidence of the inflammation in the far and near surroundings which vanishes sometimes quicker and sometimes slower, depending on its severity and extent, and where the optic nerve is involved only by pressure of the inflammatory edema the disappearance of this involvement and the return of visual acuity may be immediate. This immediate outcome is frankly pathognomonic.

The author feels that the visual disturbance may disappear without any intervention. Since, therefore, the outcome occasionally results from small, unmeaning intervention, such as bare cocainization or a little operative procedure consisting of uncapping slightly swollen cells, resulting satisfactorily, the author feels that we must, on the ground of the apparent etiology in a series of cases, expect a spontaneous recovery. Experience has shown that many patients with retrobulbar neuritis which, on account of the results of nasal therapy are spoken of as rhinologic, later after months or years show multiple sclerosis. From that it is argued that the optic disease, as is so often present, is the first manifest symptom of multiple sclerosis. This optic disease, after a short while has spontaneously disappeared in connection with nasal intervention. This was merely an accident.

The author feels that optic damage may be the manifestation of a focus of multiple sclerosis, and in these cases it would be interesting to obtain statistical explanations, though the literature does not give sufficient evidence at the present time.

We hear that the ocular disturbance has developed in connection with an acute cold or with an acute exacerbation of a long-standing nasal disease. Some weeks of progressive increase in optic disturbance follow. Every therapy (salicylates, sweats, etc.) has failed to bring about a cure until the moment of nasal study and treatment. All these conditions may be united in a particular case, and they allow the conclusive force of the outcome not to be weakened.

According to the author there are only two possibilities to consider, in connection with retrobulbar optic neuritis:

First, the fact that the multiple sclerosis is accompanied by an optic damage; and

Second, for the detection of the neuritis both nasal disease and multiple sclerosis are to be held responsible.

Multiple sclerosis is an infectious disease. The place of infection, the manner in which the virus is spread through the body is unknown, also why it has particular preference for the white matter of the nerve tissue. That the exciting cause may remain for a long time latent in the organism is known, and a lapse of months or years from the first symptom, namely, neuritis, may pass before the later symptoms of paresis appear.

We speak of latent sclerosis. The assumption that between the infection and the appearance of the primary manifestations, a shorter or longer time passes is obvious and therefore we should speak of this as an incubation period. The author has found that the optic nerve has been involved from the accessory sinuses by the focus of multiple sclerosis. The author feels that this conception is clearly of a hypothetical nature, but it has sprung from the necessity of making allowance for visible clinical facts and it is necessary for this reason that many more observations be made before a simple interpretation can be found. A diseased state approaching nearest to multiple sclerosis is found in the poisons of tobacco, lead and syphilis.

Taking multiple sclerosis as the basis, a comparatively small percentage of retrobulbar neuritis is found: Uthoff, from 5 to 8 per cent., Frank-Oppenheim 15 per cent.

Passing from retrobulbar neuritis, high percentages come for multiple sclerosis: Marburg, 55 per cent.; Fleischer, 66 per cent. To all appearance the optic nerve is very sensitive to the infection, or better yet its resistance compared to the central and peripheral nervous systems is slight. The author feels that from this the idea follows that the anatomic location of the optic nerve in the midst of the accessory sinus cell systems, a region which frequently is affected and occasionally involved by highly virulent organisms, explains the means by which the spread of the sclerosis virus takes place. The author feels that if this explanation is proved correct, at least for a portion of the cases, the possibility of primary optic disease in multiple sclerosis would be found.

Recently, Behr offered an entirely new point of view for the etiology of multiple sclerosis. His considerations led to the feeling that on account of the anatomic location of the nerves, the optic disease of the primary infection resulted from the source of involvement which lay in the mucosa of the sinuses. This view is supported experimentally. Ethmoid material obtained by operation from patients with multiple sclerosis was inoculated into rabbits producing paresis and paralysis of the optic nerves, which very much resembled that of human optic neuritis. As the histologic researches have yet to be done, no definite opinion can be given. In every case the experiments of Behr are of interest and bring out the significance of the accessory cavities, namely, the ethmoids as etiologic causes of optic neuritis.

H. H. Vail, Cincinnati.

The Pathogenesis of Anaphylactic Asthma. Kaj Baajoe, Acta Pediat. **3**:369 (June 16) 1924.

The substances which are able to excite an attack of anaphylactic asthma all have a marked and characteristic action on the capillaries and lymphatic

vessels of the anaphylactic organism, which leads to hyperemia and asthma. Thus on inhalation they produce, first, swelling of the nasal mucous membrane with consequent stenosis (vasomotor rhinitis), afterward, swelling of the mucous membrane of the lower respiratory passages, which gives rise to stenosis of the bronchioles. This swelling alone (or in association with bronchial spasm) is the cause of the asthmatic attack.

On injection of the asthmogenic substance, it is likewise the locally active quality which first makes itself felt. In the skin it occasions hyperemia and edema (urticaria), and the mucous membrane of the bronchioles is subject to an exactly similar condition in the form of swelling. This swelling alone (or in association with bronchial spasm) is the cause of the asthmatic attack, and is due to a vasomotor paresis of peripheral origin.

The author discusses the work of Huber and Koessler (*Arch. Int. Med.* **30:** 689 [1922]), but does not concur in their conclusion that the exudation, infiltration and hypertrophy found in the lungs of asthmatic patients is due entirely to the asthmatic process. He feels that these changes may be due to the chronic bronchitis which often accompanies the asthma.

CONNOR, St. Paul.

Society Transactions

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY

Chicago, Dec. 5, 1924

NORVAL H. PIERCE, M.D., *Chairman*

A meeting was held Monday evening, in celebration of the twenty-fifth anniversary of the founding of the organization by Dr. E. Fletcher Ingals in 1899, and known as the Chicago Laryngological and Climatological Society. The following charter members were present: Drs. Pierce, Rhodes, Corwin, Shambaugh, Freer, Hardy, Campbell and Stein. Dr. Norval H. Pierce, who was the fifth president of the Society, was made chairman for the evening and Dr. John Edwin Rhodes, the second secretary, was made secretary for the evening. Twenty-two men responded to the call of Dr. Ingals at the time the Society was formed; eleven of these are still living. Addresses were made by a number of the older members, including Dr. Corwin, who responded in humorous verse; Dr. Allport, who gave reminiscences of the first ten years; Dr. William A. Evans, Dr. O. T. Freer, Dr. J. M. Hardy, Dr. J. Holinger, Dr. Joseph C. Beck, Dr. Elmer Kenyon, and Dr. G. E. Shambaugh.

AUSTIN A. HAYDEN, M.D., *Secretary.*

COLLEGE OF PHYSICIANS, PHILADELPHIA, SECTION ON OTOLOGY AND LARYNGOLOGY

Dec. 17, 1924

GEORGE FETTEROLF, M.D., *President*

RESEARCHES IN THE MINUTE ANATOMY OF THE INTERNAL EAR. Presented by DR. GEORGE E. SHAMBAUGH.

It is always a pleasure and an inspiration to be granted the privilege of hearing the problems, successes, failures, ultimate end-results and conclusions that go hand in hand with investigative work of previously unsolved or doubtful scientific questions. Such a privilege was given to the Section with the appearance of Dr. Shambaugh, who spoke about his own work on the anatomy of the inner ear.

In a vivid, forceful, yet modest manner he verbally sketched a picture of his years of careful, painstaking and time consuming investigations of the anatomy of the temporal bone. As one listened to the speaker the truth of the axiom, "There is no royal road to learning," was driven home. In all, about eighteen years of Dr. Shambaugh's life was devoted to this problem. During this time, hundreds of specimens were prepared and examined, of which many failed conclusively to demonstrate the desired anatomic points. Profiting by these failures, a technic was finally arrived at, that capably demonstrated the doubtful anatomic questions.

The lantern slides showing his preparations demonstrating the circulation of the labyrinth, were of particular interest. It was pointed out how an embolus, due to the peculiarities of this vasculature, could cut off the blood supply to all, or selective portions of the labyrinth, depending on the blockage of the main stem artery or one of its branches. These branches are end arteries.

and a blockage of one means anemic infarction of the part supplied, for the collateral circulation is either slight or absent. Such anatomic knowledge can be used in explaining many patients showing atypical symptoms of Ménière's symptom complex. It is the feeling of Dr. Shambaugh that most of the so-called Ménière's symptoms are embolic rather than hemorrhagic in origin.

That the membrana tectoria in life is attached to the hair cells of Corti's organ was clearly demonstrated by numerous photomicrographs of that part. By Dr. Shambaugh its separation, so often seen in preparations, is considered to be an artifact. Various stages of development of the striae vascularis were shown, and the evidence that it is made up of both epithelial and connective tissue elements was convincing and conclusive. Along with the sulcus spiralis externus, which was demonstrated to possess a gland-like structure, it is probably concerned in the production of the endolymph.

DISCUSSION

Dr. J. Parson Schaeffer called attention to the fact that America has contributed much to the knowledge of the genesis, anatomy and physiology of the ear. He most strongly advocated the policy which has been followed by Dr. Shambaugh, namely, that experimental research should be the handmaiden of clinical medicine. He spoke of the striae vascularis and its possible function. He advanced the idea that this structure may possibly be concerned in the regulation of the endolymph temperature, or by sympathetic nerve connections act in a way analogous to erectile tissue and in this manner regulate the intralabyrinthine pressure.

Dr. B. A. Randall presented a series of lantern slides, demonstrating various anatomic points of the inner ear. He defended the Helmholz resonance theory of hearing, and felt that Gray of Glasgow had done much to substantiate this hypothesis.

Dr. S. MacCuen Smith stated that a knowledge of anatomy and physiology of any given part must be obtained before reasonable understanding of pathologic processes is possible. To such men as Shambaugh, Fraser, Dickie and others, who have spent much time and energy in the attempt to solve the problems of the internal ear, the profession is deeply obligated. He called attention to the mental decline of the deaf and dumb and the necessity of still further investigation concerning the relation of the auditory apparatus and central nervous structures. The importance of the aurists bearing in mind the peculiarities of the labyrinthine circulation and its pathologic possibilities, as pointed out by Dr. Shambaugh, was emphasized.

Dr. Shambaugh (closing) considered the idea suggested by Schaeffer, that the stria vascularis probably has something to do with intralabyrinthine pressure, a very interesting one. A number of years ago he called attention to the fact that in order to account for the constant flow of tonus impulses which emanate from the end-organs of the labyrinth, one must account for some constant means of stimulating these end organs. This is provided for in the macula by the otolith apparatus and the force of specific gravity. In order to account for the flow of tonus impulses from the crista ampullaris, it would seem that we must have some movement of the endolymph. This can readily be explained as due to the rise and fall of intralabyrinthine pressure with each pulsation of the heart, and the release of this pressure through the ductus endolymphaticus and the expansion tank, the saccus endolymphaticus. Why should not this stria vacularis be one of the primary factors in producing this necessary rise and fall of intralabyrinthine pressure, and the necessary to and fro motions of the endolymph, which are essential in accounting for the constant flow of tonus?

THE CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY

Regular Monthly Meeting, Jan. 5, 1925

EDWARD P. NORCROSS, M.D., *President, in the Chair*

PRESENTATION OF SPECIMENS. DR. GEORGE W. BOOT.

Dr. Boot presented a roentgen-ray picture of the chest of a boy, who had inhaled a cork which completely closed the left bronchus. No air entered the left lung, and the left lung gave a dense shadow throughout its whole area. The boy's father tried Christian science for two months before he was referred to Dr. Boot, who removed the cork by lower bronchoscopy. The patient had a lung abscess and coughed up large quantities of foul pus, but has since recovered.

Dr. Boot next presented a specimen of cancer of the antrum, in which it was necessary to remove everything from the roof of the orbit to the floor of the antrum, including the eye and the inner wall of the antrum, and back to and including the anterior wall of the sphenoid. In spite of this extensive removal, the patient is in good condition but has a local recurrence of the cancer, without metastases

Dr. Boot also presented the brains from two patients, who died as the result of brain abscess. One was a metastasis from a sore throat, and was a superficial abscess in the region of the speech center in the third frontal convolution. The other was an abscess of the left temporosphenoidal lobe that ruptured into the lateral ventricle. This patient had no aphasia. Her temperature jumped from normal to 105 F. and her pulse from about 57 to 150 at the time the abscess ruptured.

SCHAEFER-GALTON WHISTLE. Presented by DR. ROBERT SONNENSCHEIN.

The essayist called attention briefly to some of the previous models of whistles used in otology, and stated that the new modification of the Galton whistle by Schaefer has a fixed mouth piece. The apparatus is so constructed that one is able to hold it with two or three fingers and with the other fingers of the same hand to manipulate the pipe length. In order to get a constant, forceful air pressure, a double bulb is used. This has also been recommended for the Edelmann-Galton whistle. The short compressions of a single bulb often produce vibrations of only the edge of the pipe length, but by means of the double bulb, there is resonance of the tones of the pipe itself.

The gradations on the pipe length are in half-millimeters. The technic is to set the pipe at a point supposedly above the high tone limit of the patient, bring the whistle close to the ear with the aperture near the meatus, then apply pressure and lengthen the pipe until the sound is heard. Then the process is reversed by beginning with the tones easily heard and shortening the pipe until the tone is no longer heard. The midpoint between the two readings usually shows the upper tone limit. A chart is furnished showing the pitches at the various pipe lengths.

The advantages of the Schaefer-Galton whistle are: The aperture is fixed at a constant point and needs no adjusting; it requires only one hand to manipulate the apparatus, and it is somewhat cheaper than the Edelmann-Galton whistle.

DISCUSSION

DR. HARRY L. POLLOCK said the Schaefer-Galton whistle had been useless in their hands since they obtained the monocord, for with that instrument they can set the fret for any tone they wish. It covers the whole range, and is very easy to use because one can obtain both air and bone conduction with the same instrument.

DR. AUSTIN A. HAYDEN requested Dr. Sonnenschein to demonstrate the use of the whistle a little more fully.

DR. JACQUES HOLINGER said the objection to the whistle as an instrument to test hearing for highest pitch is that in the higher octaves a quarter of a turn of the piston has quite a different effect on pitch than in the lower octaves. Edelmann recognized this and tried to correct it by means of the chart. They attempted to overcome the difficulty with the monocord and succeeded to a considerable degree, but the gaging by dark figures or any other method is inaccurate in very high pitch.

DR. ALFRED LEWY asked if any other kind of metal had been used in the whistle to overcome the erosion occurring in the old instrument.

DR. JOSEPH C. BECK asked what objection there was to using greater air pressure by means of compressed air.

DR. SONNENSCHEIN (closing), in reply to Dr. Holinger, said that Edelmann tried to correct this by using the chart. So long as calibrations are made correctly, they will show the definite pitch depending on the pipe length.

He did not know whether the metal employed in the new whistle was different from that in the old, and whether it was noncorrosive. Neither did he know whether the Edelmann-Galton whistles were made with the definite air pressure or not, for the chart did not show it. But the chart of the Schaefer whistle states that it is made with 9 cm. of mercury, which is a definite air pressure. If one used compressed air, he would not know just what pitch was being produced unless he had the whole whistle calibrated at that pressure. Dr. Sonnenschein could see no objection to compressed air if the whistle was calibrated properly.

He demonstrated the whistle in which Schaefer said the highest tones were produced by 2 mm. If one determined that the patients hear at 3 mm., this is 17,000 vibrations. Then set the whistle much lower, at 10,000 or 12,000 vibrations, and then approach the high point.

SOME OBSERVATIONS IN THE TREATMENT OF DEAFNESS BY THE "ACOUSTIC METHOD." Presented by DR. SAMUEL SALINGER. (This paper will appear in full in a later issue.)

This is a report of our results in a series of sixteen cases treated with amplified tone. The machine employed is built on the principle of the radio. The sounds are obtained from an ordinary phonograph playing any desired record, and are conducted through a series of vacuum tubes amplified by batteries and controlled as to intensity and volume by means of convenient rheostats. The amplified tones are then conveyed to the patient's ears by means of a regular radio head piece. It is possible to increase the intensity of the sounds produced by the phonograph up to the point where they may even cause pain. It is the claim of the producers of this instrument that, no matter how far gone the hearing may be, it is possible to reawaken the perception by means of this excess tone stimulation, and develop it by repeated applications of the loud sounds. Even though the end-organs be destroyed, it is claimed tone perception can be developed in the brain if the sound be but loud enough to reach it. Also, it is claimed that in conduction deafness, the vibrations produced by the loud tones directly at the ear will help to develop the responsiveness of the ossicular chain and muscles and thus result in improved hearing.

Six patients were cases of nerve and labyrinth deafness. Of these, one was improved, one was worse, two showed no change and two were doubtful. Six were otosclerosis subjects. Of these, four were worse and two were doubtful. We had four cases of conduction deafness, of which one patient was improved and three were worse. The patients who showed improvement were in the minority, and one would have to be cautious in attributing this improvement to the treatment, knowing as we do the psychologic effect of

a new method of treatment on impressionable persons, and also keeping in mind the fact that some subjects improve spontaneously under certain conditions.

One significant fact which the treatment brought out was the reduction of hearing for high tones in six patients. It bears out our contention that the treatment is harmful, from the fact that the repeated and continual application of loud sounds to the ear must inevitably lead to degeneration in the organ of Corti, as has been often proved, both by experiments on animals and by observations on patients who work in noisy places.

DISCUSSION

Dr. Otto J. Stein said he had no personal experience with this so-called acoustic method. Dr. Salinger's report on sixteen cases showed only two subjects in which there was any perceptible improvement, which was not a very good showing. Attempts at stimulating hearing have been made for many years and he believed it was only a question of the method and its application that should be considered. The use of the voice is the oldest method of stimulating the hearing apparatus, and it probably remains the best today. Attempts to devise apparatus and instruments to supplant the voice have been numerous but not very successful. Dr. Stein asked if the high frequency current had been used in connection with this apparatus.

Dr. Alfred Lewy said he had been requested to examine the instrument, and informed the Deafone people that he had communicated with Dr. Salinger and knew his results. The agent then told him that Dr. Salinger had not used the proper technic and referred him to Dr. Max T. Goldstein. Dr. Goldstein told him he still had the instrument under investigation, and that any use of his name was without his authorization until he had completed the investigation.

Dr. Robert Sonnenschein thought the Society should be grateful to Dr. Salinger for publishing this paper, for it is very seldom that accurately controlled tests with various apparatus have been published. In the last few years, extravagant claims have been made for such instruments, and many times these are based solely on the psychologic effect which they have on the patients.

He did not think Dr. Salinger mentioned the degree of amplification of sound which was necessary to produce any improvement. As shown by the work of Wilson and Minton, it is often necessary to increase the intensity of the tone a million, a billion or more times. In such cases this is of no value, for it is impossible in most instances to increase the tone 200 or 300 times. If there is no improvement until this is increased a million or billion times, there can be no practical value so far as the hearing of the patient is concerned.

Dr. Elmer L. Kenyon thought it would be well to consider the psychologic aspect of training the deafened by use of speech words and sounds. One must bear in mind that the faculties of attention and concentration are under discipline during such training with the voice. Also that in using the voice to improve the hearing, the word which is used is analyzed in the procedure, so that the subject under training comes to appreciate certain emphatic sounds in the word, and realizes that those sounds must appear in that word. A deaf person who does not get the whole word but the word in part, finds this of hearing advantage. Partly by lip reading, partly by the context and partly by the key sounds he hears, the person arrives at his interpretation of the word spoken. The benefit of such training is probably all, or nearly all, psychologic.

Dr. George W. Boot thought the falsity of some statements is so self-evident that we should not take time to disprove them. That it is possible to restore a function lost by degeneration or overuse by still more over-

stimulation is one of them. It is irrational to expect to restore hearing in an ear, deaf because of degeneration of the organ of Corti, by compelling it to listen to the noise of a Deafone or any other method of overstimulation.

Dr. Joseph C. Beck believed that the only way these unscientific methods of treatment could be overcome was to try them accurately and then report the results. They had permitted the apparatus to be placed in their hospital where they could treat the patients and observe their attitude toward it, and then test the patients immediately after the treatment, and later to see if there was any change for better or for worse. They were treating a number of subjects who were markedly deaf. It was easy to see that with this instrument, some patients might be made worse, because if the apparatus was used by some inexperienced person it would have the effect of a gunshot near the head. Most of the patients they had treated had been made worse immediately, but later some seemed to have improved, which he thought might be only the psychologic effect. He considered the instrument a nuisance to have around because of the noise it makes, and was skeptical in regard to its value.

Dr. George E. Shambaurh expressed his gratitude to Dr. Salinger for carrying out these tests. The results were exactly what one would expect, in view of what we know already regarding the effects of bombarding the ear with sounds. Degeneration rather than improvement is what really takes place.

He thought Dr. Kenyon had answered the question very well as to whether there is actual improvement in hearing due to stimulation of the end-organ by exercising with the voice as has often been claimed. He became interested in this question from the work of Victor Urbantschitsch in Vienna many years ago. In observing this work, it seemed to him that the apparent improvement in hearing was nothing more than an education of the cerebral function in putting together slight fragments of hearing, recognizing them as certain words. This process is what one always does with normal hearing in a large lecture room; one never hears all that is being said but "pieces out," a cerebral rather than an aural function.

Dr. Harry L. Pollock asked Dr. Salinger if the treatment made any impression on the tinnitus which was present in some cases.

Dr. Salinger (closing) said that the patient receives through the apparatus tones which are amplified up to a point where he perceives them. The patient hears one or more phonograph records played over and over again for forty-five minutes. He did not use the high frequency current in connection with this treatment. There was no change whatever in the tinnitus.

He pointed out that, in connection with the apparatus, the microphone attachment might be developed into something useful. By this microphone, the human voice can be amplified and conducted to the head pieces over the patient's ears, and he thought this might be of some value. Many of the deaf children whom he had examined were able to distinguish vowels by this means, and he thought possibly it might be of service in training and developing their speech. However, even if the deaf could be made to hear the tones of increased intensity, this was of no practical value because one cannot, under the normal conditions of daily life, bring the human voice or musical instrument up to that intensity.

Mastoiditis: Delayed Operation in Four Cases. (Entrance Thesis.) Presented by Dr. C. J. Swan.

The essayist called attention to the fact that at the present time one hears much of the sin of too early operation and little of the dangers of too late operation. It is even possible that an operator would be more severely criticized by his colleagues for a too early, and possibly unnecessary operation, than for waiting too long for more definite symptoms, and perhaps a fatal termination because of complications. He reported the cases of four patients whom he had observed in his practice for whom interference was too late. Two

of them when first seen had already passed beyond the arbitrary period of waiting outlined by some authorities, but in neither had the outstanding symptoms indicating the necessity for operation appeared. Three of these patients had complications terminating in death, and one patient had a long and stormy convalescence.

Dr. Swan emphasized the beneficial effect of blood transfusion in cases in which the infection is gradually overcoming the resistance of the patient. Such transfusions were made in two cases, using uncitrated blood after the method used by Dr. Lespinasse.

He would much prefer to operate only after three weeks, when one can be reasonably certain that decalcification has taken place, that the infected area is deliminated, and that the patient has perhaps established an immunity to the infection. He has seen decalcification takes place in less than ten days, and has yet to see the spread of the infection due to lack of immunity in the early operation. An experienced and careful operator may open the mastoid very early with, so far as he has observed, relative impunity except as to the delayed healing. Dr. George Dick, who was pathologist at Camp Pike during the World War, made more than fifty postmortem examinations of men who had died from the complications of mastoiditis, having been operated on too late or not at all.

The teaching that goes emanates at present from the influential groups that believe in too much waiting, is pernicious and dangerous, and gives standing to many medical pacifists who are not entitled to it. Too much stress is laid on the necessity for waiting until it is obvious to any one that it is necessary to operate. The virulence of the infection, differs greatly in many of the patients and the infection differs in virulence in different years. The essayist believes it is futile to attempt to make any hard and fast rule as to when to operate, that each case should be judged on its merits, and if the surgeon is still in doubt he should operate. When a surgeon has charge of an acute mastoiditis from the onset, and the patient dies from a complication, death is usually due to too long delayed interference, and on the surgeon should rest the blame and the responsibility.

DISCUSSION

Dr. Alfred Lewy agreed that there is such a thing as waiting too long before operating in mastoiditis and also such a thing as operating too early. One cannot wait three weeks in all cases; in some one cannot wait one week, but patients requiring operation within one week have been rare in his experience. He has seen patients die of meningitis within three days of the onset of earache, and only recently had a patient who died of meningitis within a week of the onset of ear symptoms. The necropsy showed the ear merely as coincident, not causative of the meningitis. Such cases are blood stream infections, with meningitis as the terminal lesion.

Dr. Lewy thought that in none of Dr. Swan's cases would the proper time for operation have been overlooked by a competent otologist.

He also asked why Dr. Swan used the term "edema," and why this description continues to appear in the textbooks as a symptom of mastoiditis. In his experience, edema over the mastoid is commonly associated with furunculosis of the canal as distinguished from infiltration of the periosteum which appears with mastoiditis. The decision to operate does not rest on any one indication but on the entire picture studied in detail. To his mind the most important phases are not the local symptoms but the general condition. First, the appearance of the patient, who has the waxy pallor of sepsis. Second, the presence of insomnia, and these he thought should take precedence over the usually described local symptoms.

Dr. Charles M. Robertson thought the purport of the whole matter is the resistance of the patient, the amount of infection present and the character of the infection. He believed that one should also disregard external

swelling and the sagging of the posterior superior wall, as these are unreliable in mastoid surgery. In his opinion the safest method of telling when to operate and when to wait is to take the blood picture and ascertain the extent of the infection. He agreed with what Dr. Swan said, and thought one could tell exactly what was going on in the body by means of the blood picture. The blood culture is hard to make and he thought it was not safe to place too much confidence in the culture. If the infection is due to staphylococcus or some germ that is slow in decalcifying the mastoid, one can afford to wait. If there is a virulent organism at work, the surgeon must operate quickly if he expects to save his patient.

Dr. Robertson is firmly of the opinion that every operation on the mastoid should be made so that the sinus and dura are both exposed, so that one can make a thorough examination and discover whether there are any necrotic spots, whether the dura looks healthy, and whether the brain is under pressure or the sinus thrombosed.

Dr. Sonnenschein asked Dr. Robertson to describe the character of the blood picture which he considered as a prognostic sign.

Dr. Robertson said that he always watched the differential white count, being guided by the polymorphonuclear percentage. If the polymorphonuclear count becomes high, the small leukocyte count becomes low, which shows lowered resistance. If the polymorphonuclear count is below 70 per cent. he is willing to wait; if above 70 per cent. he is willing to operate.

Dr. George E. Shambaugh found himself somewhat confused as to just what Dr. Swan meant by "delayed operation," but after listening to the conclusions in his paper he was left with the impression that by "delayed operation" he meant delay after the recognition of the otitis media, since most cases of otitis media that are severe at all have an involvement of the mastoid. With this view he was not at all in accord. Very few cases of mastoiditis ever call for operative interference. The cases which Dr. Swan cited were all cases of neglected operation, in which any well-trained otologist would have no difficulty in recognizing indications for operative interference. If Dr. Swan really meant that every patient in which one was able to recognize mastoiditis should be operated on within a week or less after the onset, Dr. Shambaugh did not agree with him.

Dr. Samuel Salinger stated that there are two general types of mastoiditis, one in which there is a predominance of local symptoms and another in which the constitutional symptoms predominate. In the type in which the local symptoms predominate, one very seldom encounters trouble by waiting for a localization of the symptoms, and when one operates one feels confident of not overlooking anything. In the type in which the constitutional symptoms predominate, he believed one could not operate too early.

Dr. Edwin McGinnis was interested in the type of mastoiditis with general symptoms. The patient may have tonsillitis giving general symptoms which may also be the starting point of the mastoiditis. In such a patient it is useless to operate on the mastoid, unless one makes an attempt to eliminate the primary infection.

Dr. George W. Boot had twice operated on mastoiditis on the third day of mastoid symptoms. Both patients died. The first patient had just had typhoid when a severe nosebleed ensued, which required packing of the nose for several days. Because of the nasal packing, he developed an acute suppurative otitis in the right ear and mastoiditis. He had had chronic interstitial nephritis, and because of this was totally deaf in the left ear and partly deaf in the right ear. In the hope of saving what little hearing he had, the operation was done early. He promptly developed erysipelas of the wound, cellulitis of the neck and choked to death.

The second patient also had chronic interstitial nephritis. He was aged 73, and in a poor condition, so that the mastoid operation was done on the left side

under local anesthesia. He, too, developed erysipelas on the side of operation but it cleared up. Then he had a right sided erysipelas which also cleared up. Finally, he developed erysipelas of the left leg with multiple abscesses and died of exhaustion.

DR. NORVAL H. PIERCE said that the essayist did not add to any of the indications for the proper moment for operating, nor did he give any information regarding the time which should be allowed to elapse. The cases he reported should be called neglected cases. Dr. Pierce thought it a great mistake to try to establish "schisms" in the profession, such as early operators or late operators. It is much better, as Dr. Swan said, to strive to be rational, and in order to become rational, one must use every bit of knowledge which is obtainable regarding inflammation of the mastoid. In his opinion, the sagging of the posterior wall and every available indication, although not conclusive in itself, is of value when taken in conjunction with the clinical picture as a whole in a given case. Infiltration over the mastoid (infiltration, not edema), he considered a very valuable indication of involvement of the mastoid, but not necessarily conclusive as to operative necessity, especially when it occurs in the first few days of an acute otitis media. Tenderness, infiltration over the mastoid in the first few days of an acute otitis media are not in themselves indications for operation. The same symptoms at the end of the second week are indicative. There is no one local sign that in itself is conclusive regarding the proper moment for operating, before the stage of advanced infiltration, subperiosteal abscess or fistula. On the other hand, in the absence of all local signs, an operation may be imperative.

It must be remembered that the process of decalcification is one of the great gains in understanding the pathology of mastoid involvement. In the ordinary mastoid inflammation, it requires a certain length of time for decalcification to occur. This is not a matter of individual opinion but of general knowledge obtained by microscopic study, not by men in Chicago alone, but by otopathologists the world over. It is also known that in the mastoid, inflammation extends in two ways, by the softening process (decalcification) and by the blood pathways. One must always taken into consideration the age of the patient. The mastoiditis in an infant is entirely different from the mastoiditis in a child, and the same symptoms in the child have an entirely different significance from those seen in adults, largely because of the vascular supply and the morphology of the mastoid. He referred to fever especially and infiltration or pain. The pathologic changes in the mastoid and their clinical manifestations depend also on the specific germ that is infecting the individual. Type III produces an entirely different pathologic process from the *Streptococcus hemolyticus,* which latter germ Dr. Pierce considered not so frightful as is ordinarily supposed. The type of mucosa has much to do with the course of the infection, and this can be judged by the roentgenogram. The character of the mucosa corresponds to the amount of pneumatization present. The bony structure of the mastoid in each individual case has an important bearing on the problem. One must use not only the local symptoms but the roentgenographic findings, and he believed that the roentgenogram will undoubtedly gain in importance as time goes on.

In his opinion in a patient without external signs, without fever, and a considerable amount of pure pus coming from the external auditory canal, in the third week the mastoid should be opened. The only person who is more dangerous than the man who operates too early is the man who operates too late.

Dr. Pierce thought Dr. Boot's remarks prove one could not operate with impunity in any case. When a patient takes an anesthetic he is in danger, and one should avoid unnecessary operating so far as possible.

Dr. Pierce believed Dr. Swan placed an unfair burden on the surgeons when he said that they must bear the responsibility of death in all these cases. Many elements in mastoid pathology are beyond the control of the surgeon, be he

ever so learned, skilful and conscientious, and among the principal factors are abnormal vascular communications between the mastoid, the sinus and especially the meninges. These abnormal vascular communications occur most frequently in connection with abnormal pneumatization, and may become involved at the very onset of an acute otitis media. In a case seen recently, the patient died on the second or third day after the beginning of an acute otitis media which was not severe. Dr. Pierce cited several cases in which very early operation had been performed, without preventing death, and stated that certain of these patients will die regardless of what surgical measures are employed.

Dr. Swan had criticized the concept that one should wait before operating unless there were signs of complications. Dr. Pierce had said something like this, having in mind the case of a child, aged 6, with acute otitis media following tonsillitis, in which paracentesis was done within twenty-four hours. A few days later the child had a violent chill, temperature of 106 or 107 F., a high leukocyte count, no pain over the mastoid or swelling in the mastoid fossa. He recommended operation and about forty-eight hours later he was called to see the child in the night and on opening the mastoid found it normal. He explored the sinus and found it normal, then tied off the jugular vein and the patient, after a rather stormy convalescence, recovered. This was a case of primary, isolated thrombosis of the jugular bulb, an illustration of operating before decalcification occurred, and showing that every case is a law unto itself.

DR. SWAN (closing) said the point he wished to make was that too much emphasis was being placed on waiting. He had gained this impression from a meeting which he had attended at which a great deal was said about the necessity of waiting until undoubted symptoms were present, not less than ten days, and nothing was said of the dangers of complications.

He agreed with Dr. Robertson in regard to operating at any specified time, and thought it was impossible to lay down definite rules for all cases. He agreed with Dr. Pierce that every case presented an individual problem and should be studied as such, as he stated in his paper. In many mastoid cases one does get pitting over the mastoid, and he likes to call this edema because that is what it is. In general sepsis, of course, no matter when one operates the patients may die as the result of the general infection, but this condition was not included in his list of cases or in the idea of his paper.

A. A. HAYDEN, M.D., *Secretary.*

Book Review

LOUDER PLEASE. By EARNEST ELMO CALKINS. Boston: Atlantic Monthly Press, 1924.

This is an interesting story of how a man with the handicap of deafness successfully solves the problems of life. The book should be read by every practicing otologist, whose work brings him in contact with those suffering from incurable deafness. Its perusal will provide him with a means for assisting these people where medical science fails, for it should enable him to impart some of the cheerful philosophy of the author. Every deafened person will be cheered by this story of the struggle and the success of a deafened man. The otologist will do a real service in bringing this book to the attention of his deafened patients.